

February 1984 \$2.95

THE Color Computer...

MAGAZINE

For Users of the TRS-80™ Color Computers

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other wonders**

**Programming
Project Winners**

Sorcerer's Puzzles

Interview: Steve Bjork

Getting Published

**Arcade Game
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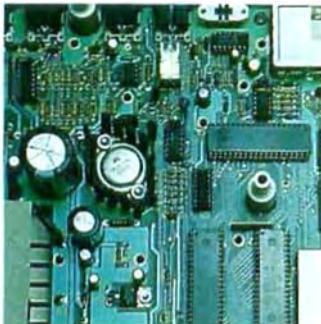
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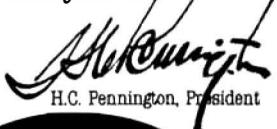
CompuThoughts

I can't begin to tell you everything about this book—it's unusual. The first things you notice about it are that it has no page numbers and the "table of contents" has over 2,000 entries in alphabetical order. Here's why:

We use TRS-80s—from accounting to typesetting. The variations of BASIC, applications software, hardware and operating systems is more than can be remembered. Nothing gets done when your nose is in a manual.

Why can't "they" make a book that has everything in one place? Hell's fire, "we" are "they!" I told Bill Barden that if he would write such a book I would do two things: 1) I'd publish it and 2) I would quit bitching.

I use it everyday. It answers my questions. It'll answer yours too.


H.C. Pennington, President

IJG

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PEEK (02,84)

We promised you games, and games you shall have. Several games, in fact — what a welcome thing to receive in the midst of February, when it's just too cold or dreary to get much at all accomplished around most of the country! Well, here's a fine excuse to stay home, warm and dry, snuggled up to your Color Computer.

This issue should make the game lovers in our audience very happy. In fact, some of the games in this issue should win over the hearts of even the most steadfast game despisers amongst our readers. GOTO 79 to discover who won the Summer Programming Project (a great game-writing contest) and then continue on to play two of the fine games that won prizes. Over the next few months each of the winning games will be presented so all our readers can enjoy them. I believe you'll be surprised and pleased at the fine quality of the winners — the games and their presentation are fun and very professional. In fact, they put some commercial games to shame!



Gamers and thinkers, after you have savored the Project winners (fingers tired yet?), you should GOTO 24 for yet another installment of the adventures of Sunflower and Poke in Sorcerer's Puzzles. Our two erstwhile apprentices have new adventures and new puzzles waiting for solutions.

Ever wondered how a game programmer gets started in the business? How does a game idea develop from the twitch in a programmer's fingers to the final, packaged, four-color wonder you buy in a store? What does a famous game programmer think of other games on the market? GOTO 87 — Steve Bjork, author of many popular computer games, and game-player extraordinaire, tells all in this fascinating interview.



Almost everyone has a program they dream of selling some day. Before you take the big step of contacting a software publisher, take time to GOTO 19 and read this article

carefully — it could make a big difference in the way you present your program, and the results you get from the publisher.

Teachers! GOTO 12 to GOTO SCHOOL. Dr. Kimmelman has some interesting thoughts on affective learning that you won't want to miss.

Let me introduce to you a new column by an old friend: GOTO 22 for DOWNLOAD "SIG" by Wayne Day, the Sysop for the Color Sig on CompuServe. Many of you already know him; Wayne is going to introduce newcomers to the sig, and keep us up to date on sig happenings and hints in his new column, which will appear every other month.

It's the beginning of a new year: time to get those records into shape, so you won't have to struggle with your income tax preparation again *next year!* GOTO 36 for a program that will organize your family medical records in a flash.



Non-Extended users — here's something you'll welcome with open arms (or cassette port). GOTO 44 for an editor meant just for you.

For all you despairing Dissection followers, Jake's back with part six of his ROM disassembly. I know it's been mean to skip his article in November and January, but, hey — every so often we need to do something special. Anyway — GOTO 48 for the continuation; we'll try not to skip the disassembly again for a good while!

Questions answered here — GOTO 64 for DEFUSR, where all you've been wondering about becomes clear.

Kids and beginners! Jean Plessner has a bright February treat for you in Color Computing For Kids — GOTO 71, and bring your computer!

Ever wonder what goes on in that spinning box that somehow reads those strange objects called floppy disks? It will be a mystery no more, once you've finished with Bill Barden's series on disk magic. GOTO 95 for part one.

Oh, gamers! Ever wish you had an (shh!) Atari joystick? Well, don't tell anyone, but quietly GOTO 135, and wish no more!

My, the joys of graphics — and the things we never knew about our Computer! GOTO 120 for View Utility — and see what's hidden away from view.

Here's another organizer for you, to help you do 1984 right — GOTO 114 for a mail list program.

One final note, to stave off the phone calls I know will come — Dennis Kitsz was at Color Expo early this month (this is being written in November), and so we all got behind schedule with his column. Time came to send the mag to the printer, and Custom Color was still being typeset. Oh, well — you'll just have to hang on 'til next month for Color Burner!

—D.M., Editor



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DE~~IN~~FLATION

Co-Co Users! —

Follett is deflating its prices on courseware created by The Learning Company for the Color Computer.

For boys and girls preschool through thirteen, the six widely acclaimed programs include Bumble Games™.

According to the September issue of Software Merchandising, the Apple versions of these programs are on the best seller list.*

	This Month	Last Month	Mos on Chart
Bumble Plot	5	5	2
Bumble Games	6	7	2
Juggle's Rainbow	12	17	5

They are now available exclusively from Follett for the Color Computer.

(6 games), Bumble Plot™, (5 games), Juggle's Rainbow™, (3 games), Moptown Parade™, (8 games), Moptown Hotel™, (3 games), and Magic Spells™, (2 games).

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Bumble Plots	EB90201C	\$46	\$39.95		EB90201D	\$66	\$44.95	
Juggle's Rainbow	EB90202C	\$37	\$36.95		EB90202D	\$50	\$41.95	
Moptown Parade	EB90205C	\$40	\$31.95		EB90205D	\$45	\$36.95	
Moptown Hotel	EB90204C	\$30	\$25.95		EB90204D	\$36	\$31.95	
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Color Computer Magazine, June '83

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Color Computer News, June '83

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51 CHARACTER BY 24 LINE DISPLAY

Super Screen is a powerful, machine language program that significantly upgrades the performance and usefulness of 16K or greater, Extended and Disc Basic Color Computers. The standard Color Computer display screen is totally inadequate for serious, personal or business applications so Super Screen replaces it with a brand new, 51 character wide by 24 line screen including full upper and lower case characters. Instead of a confusing checkerboard appearance, you now have true lower case letters along with a screen that is capable of displaying 1224 characters. The difference is startling! Your computer takes on new dimensions and can easily handle lines of text that were simply too long and complex to display on the old screen.

COMBINE TEXT WITH HI-RES GRAPHICS

You can now write truly professional looking programs that combine text with hi-res graphics. Super Screen allows you to create graphics displays with the Basic LINE, DRAW and CIRCLE statements and then notate the graphics with descriptive text. You can even use PRINT @ if you wish for greater programming convenience. Super Screen's versatility will amaze you.

PRINT @ IS FULLY IMPLEMENTED

The PRINT @ statement is a valuable asset to the programmer when formatting text on the screen. The standard Color Computer will report an error if you specify a location higher than 511 but Super Screen allows locations all the way to 1223! You get a big screen and a powerful formatting tool as well. Of course, Super Screen also supports the CLS command allowing you to clear the big screen using standard Basic syntax.

ON ERROR GOTO

That's right! Super Screen gives you a full implementation of ON ERROR GOTO including the ERR and ERL functions. Now you can trap errors and take corrective action to prevent crashed programs and lost data using the same standard syntax as other computers. The ON ERROR GOTO capability overcomes a serious deficiency of Color Computer Basic and greatly improves your capability to handle sophisticated tasks. All well written, 'user friendly' programs use error trapping techniques and yours can too! Now that's power!

AUTO KEY REPEAT

No more frustration as you edit a long line in your Basic program; just hold the space bar down and automatically step to the desired position in the line. Need a line of asterisks? Hold the key down and auto repeat will give them to you. Those of you who spend many hours at your keyboard will appreciate this outstanding addition to Super Screen's long list of impressive capabilities.

CONTROL CODES FOR ADDITIONAL FUNCTIONS

Super Screen recognizes several special control code characters that allow selection of block or underline, solid or blinking cursor and other functions. You can 'Home up' the cursor or you may erase from the cursor to the end of a line or to the end of the screen just like many other computers. These special codes give you an extra dimension of versatility and convenience that put Super Screen in a class by itself.

AND MORE GOOD NEWS...

Super Screen comes with complete, well detailed instructions and is available on cassette or disc. It adjusts automatically to any 16K or greater, Extended or Disc Basic Color Computer or TDP-100 and uses only 2K of memory in addition to the screen memory reserved during power up. Guaranteed to be the most frequently used program in your software library... once you use it, you won't be without it! Super Screen's low price will really please you: only \$29.95 on cassette or \$32.95 on disc!



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All letters are subject to editing
for space considerations.



INKEY\$

The Color Computer Magazine

Highland Mill Camden, ME 04843

Super Spiro

I would like some information concerning "Super Spiro," (November, 1983). I was very intrigued until I discovered I was unable to do the graphics without a printer. Is there any other formula you can give so it can be typed and shown on the screen?

Todd Morason

The results on screen would be much less pleasing, due to the lower resolution. More code would be required to prevent attempts to draw off the screen (?FC ERROR prevention).

However, the core of the changes required would be changing the PRINT# = 2... statements to LINE -(.....) statements. A PSET command should be calculated and inserted before the first LINE to set the initial point.

— Eds.

Real-Time Monitor

Here is a real time monitor program I have found to be practical. It is a modified version of one published in the Frank Hogg Laboratory supplement of *Color Computer News*, April 1983.

```
10 PMODE3,1:PCLS:POKE&H167,  
&H39  
20 H$="&H"  
30 READ A$,B$  
40 FOR A=VAL(H$+A$) TO VAL  
(H$+B$)  
50 READ A$: POKE A, VAL(H$+A$)  
60 NEXTA  
70 FOR A =&H00 TO &H01FE STEP  
2  
80 POKE&H2C2,A:EXEC &H2C1
```

positive effects of software piracy for the vendor. Consumers get to see the quality of the programs a vendor is producing; if the product is of high quality, the vendor might get more business from the pirate for another program. Also, what's wrong with someone getting a bootleg copy of a program that they weren't planning to buy? The vendor isn't losing, but he or she is getting free advertisement.

One reason I don't buy all the programs I am interested in (besides the fact I'm a poor unemployed student) is because I don't like dishing out thirty dollars for something I haven't seen. The only thing I can do is wait until someone I know has a copy of the program, and then take a look at it. If a friend has a copy of it, why should I pay for it when I can have it for free?

My suggestion to vendors to help stop piracy (right from the horse's mouth) is for vendors to advertise their programs in such a way that the consumer knows what he or she is getting, rather than advertising what a great program it is supposed to be. I congratulate all the vendors who show actual screen pictures because it helps the consumer judge the quality of the program. I will buy a program which shows a picture of its screen over a competitor who is selling the same type of program and doesn't show photos.

To carry this concept a little further, I would like to see ven-

dors advertise on some of the tape magazines by putting small sections of the program on tape — like the title page with instructions or a demonstration mode which would show how the program works.

Captain Hook

You can try to justify it all you like, but the fact remains that piracy is illegal, and is simply theft, pure and simple. However, vendors — take heed of the suggestions in Capt. Hook's letter — this user may still have some good ideas!

— Eds.

Private School

My wife and I have left the ranks of public school teachers to form a private school oriented in basic academics and specializing in the exceptional child.

As we struggle financially to stay in existence, we are using our personal Color Computer with both gifted and learning disabled students. We would be most grateful for any type of hardware or software to be used with our Color Computer. We are a not-for-profit corporation and all donations are tax deductible. In addition, we will write all contributors, telling them how their gift will be used with our students.

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The Color Computer Magazine would like to help by donating a year's subscription to your school. Readers — can you help, too?

— Eds.

Clubs

Northwest Indiana

I am forming the Northwest Indiana Color Computer Club. Anyone interested can contact: Fred Kotynski, 1336 E. Elm #10, Griffith, IN 46319, (219)923-0584, or George Sievers, 3373 W. 80th Ave., Merrerville, IN 46410, (219)769-2033.

South Mississippi

This is to announce the formation of the Keesler Color Computer Club, holding monthly meetings for all computer owners/users in the South Mississippi area. If you are interested in coming to a meeting, call me, Tony Byorick, Biloxi, MS at (601)374-3375.

C.O.M.B.A.T.

COMBAT (Computer Based Advancement Training) is a newly-formed computer club within the confines of Maine State Prison.

Several months ago the prison Jaycees Chapter and The Long Timer's Group, Inc. co-sponsored the purchase of three TRS-80 Color Computers. Since that date we have created a "Getting Started with Color

Basic" instruction course; 12 men have graduated, 16 are presently attending and over 100 have enrolled.

COMBAT plans to purchase more computers and peripherals and we are open to anyone who is a Maine State Prison inmate. We don't look for many members from your Inkey\$ readers, however, we would appreciate your suggestions, correspondence and input.

Stephen Haterski
COMBAT Presentation
Director
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Three Notes

I finally typed in Jake Commander's "Star Trek." It is a beautiful program, elegantly written. Some of the lines are sheer poetry and deserve to be read aloud by a skilled actor. I learned a lot just from typing it in, and I was going to study it, but I have just been playing it.

Does anybody know how to get "CCTrek" to run again without reloading? I get ?SN ERROR IN 22963 when I try to run it again.

I keep reading advice about what to do when you get an I/O error and you want to skip to the end of that copy and get to the next one. How to do this without retyping CLOAD? I don't like removing the plugs on the side of the cassette recorder. A simpler thing to do is type MOTORON (enter) AUDIOON (enter). You will hear the info through the loud speaker of your monitor. While this program is moving by, I type CLOAD, but I don't Enter. Then when I hear the defective .copy end and the pause between programs, I press Enter. Then the next program CLOADs.

Here is a routine for CSAV-ing.

```
FORX=1TO3:MOTORON:FORT=1TO2000:NEXTT:CSAVE"PROG":NEXTX:MOTORON:SOUND1,100(ENTER)
```

The routine puts a pause between each of three copies, reminds you when it is finished, records that sound on the tape and leaves the motor on to produce a clean space after it. Just type MOTOROFF (Enter) to stop it.

Sw.Veet Atito
Montreal, Quebec

To run Jake's game without reloading, delete Lines 10 - 70 and retype them using the correction Lines 10 - 60 (pg. 46, July 1983 issue).

— Eds.

Fibonacci Fun

One of the exercises in Richard Haskell's *TRS-80 Extended Color Basic* is to write a program for the Fibonacci sequence 1 1 2 3 5 8 13 21 ... where each number in the sequence is the sum of the two immediately preceding numbers. I have seen this sequence mentioned several times, but have never seen a program to accomplish this task in print. For other interested readers I would like to submit my program.

The upper limit of Y can be the limit of the computer's range. I would appreciate hearing about other approaches from readers.

K.H. Kossmann
Columbus, OH

The listing under Kossmann's is one of our technical editor's.

— Eds.

```
10 FOR Y= 1 TO 1000 : Z= X + Y
20 PRINT Y;
30 T= Y : Y= Z : Z= X : X= T
40 T= Z : Z= Y : Y= T
50 T= Z : Z= X : X= T
60 NEXT
```

```
10 PRINT" FIBONACCI # 'S:": :PK= 1
20 PRINT PK; : FI= FJ : FJ= FK : FK= FI + FJ : GOTO 20
```

CoCo POWER

UNLEASH THE POWER IN YOUR CoCo WITH ONE (OR MORE) OF OUR BOARDS

WORD-PAK \$139.95

No longer do you have to sacrifice valuable memory and strained eyesight to expand the video display of your computer. Just plug the WORD-PAK* into the ROM port and get a high quality 80 column video display comparable to the high priced terminals. Software, included with the board, provides terminal functions, programmable screen formats (for compatibility with other computers), and screen editing capabilities. You can use it with most of your Basic programs or add the Flex Patch (below) to run all those Flex programs that require an 80 column display. Available for cassette or disk based systems (disk systems require the use of a Y-connector or expansion bus).

FLEX PATCH \$24.95

TEXPROIII (TEXT EDITOR/PROCESSOR) \$79.95

*The WORD-PAK produces a composite video signal and requires the use of a monitor capable of displaying 80 columns of text.

C-C BUS \$149.95

Connect the C-C BUS to the ROM port and instantly have six software selectable expansion slots. Expand memory beyond 64K, add a parallel port, EPROM programmer, digitizer... you name it, and software select the one you want to use without having to turn your computer off to change cartridges. The C-C BUS is compatible with any size system and automatically senses when you are in the 64K mode, preventing any contention problems. The C-C BUS is supplied complete with a built in power supply, connection cable, and molded plastic cover.

P-CPAK \$79.95

Free up your serial port for communication by adding this fully buffered Centronics compatible parallel printer port. The board can be supplied with an optional real time clock (\$69.00) or both for \$122.95.

MEM-PAK \$114.00

16K RAM/ROM expansion board. Use it to expand RAM beyond 64K (using the C-C BUS) or put your programs/utilities in ROM for instant loading.

PROTO-COCO \$10.95

Build your own expansion projects on this prototyping board that will fit in a disk controller case when you are finished. Included is a manual with several expansion ideas.

ACCESSORIES

Y-CABLE \$29.95

S-CABLE \$19.95

BARE BOARDS

Save by building your own. We will supply complete documentation including schematics, layout and parts list.

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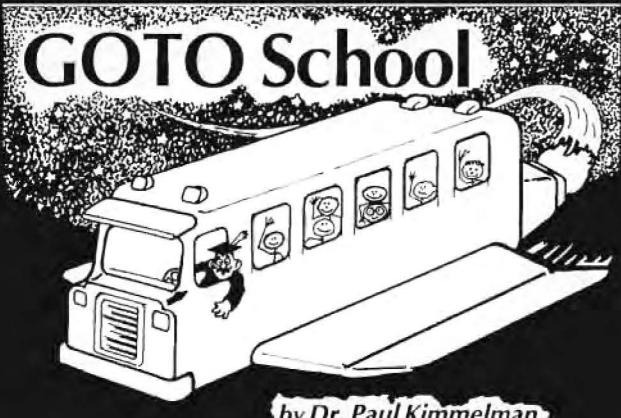
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A SOFTWARE FORMAT that has enjoyed popularity is talk-tutor. Talk-tutor is a talk and teach form of computer assisted instruction (CAI), but it seems able to keep learners involved with a task for extended periods of time. Talk-tutor programs have importance and several advantages as supplements to school curriculum.

The main advantage is that talk-tutor uses a human voice instead of a synthesized voice for explanation. The human voice is more understandable and pleasant to listen to. A fine example of a pleasant and understandable voice for an elementary talk-tutor program would be Shirley Georgi's narration in the "Old McDonald's Farm Vowels" program. When listening to Shirley it is apparent that a young learner will have little difficulty distinguishing between sounds, and a young child should feel comfortable listening to Shirley speak. Dorsett Educational Systems uses professional narrators for its software aimed at older learners.

I like talk-tutor programs because of the learning concept that can be applied with their use. You can use these programs to introduce new material; by making a student familiar with a new concept through the use of talk-tutor instruction, teachers can follow up with a review and expansion of the material in the program. Or the process can be reversed to let students use the programs to reinforce what has been taught in class. Either method is effective.

Not infrequently, students need to review new material several times. It is often difficult for a teacher to make this opportunity available. With talk-tutor programs a student can work at a computer station as often as necessary until the material is learned.

The interaction between student and computer can also be considered an advantage of this format. Incorrect responses to questions will result in the dis-

play of the correct response, or no response at all until the correct response is entered. Immediate reinforcement is important when learning. Students have immediately corrected homework assignments. Tests or quizzes could be given in this format as well.

A criticism of the talk-tutor format has been that it can disrupt the classroom. While a legitimate concern, the solution is simple; all you need is a set of headphones. For hygienic reasons, avoid the temptation to use those plastic earpieces that come with televisions and recorders. You could also enabling several students to work at the computer together.

Dorsett Educational Systems is the leader in the development of talk-tutor programs. Dorsett licensed Radio Shack to use their format in 1981, and other computer companies also use Dorsett for their talk-tutor programs. Among the programs for Color Computer users available from Dorsett are "Spelling," "Phonics," "English as a Second Language," "Numbers," "Basic Algebra," and "Physics." All these programs were designed to supplement a school curriculum or to be used at home as a self-learning package. Dorsett encourages the use of its programs as home learning packages.

Many new programs will be developed for Color Computer users. Watch our educational reviews for descriptions of the programs.

Some educators are still critical of talk-tutor programs. They claim that "the programs are nothing more than an interactive filmstrip," and this claim may be valid. However — the computer *should* be used for a variety of educational purposes. I believe the advantages of talk-tutor programs exceed the disadvantages, and each program should be evaluated on its own merit. An unpleasant voice, poor graphics, or poor subject content would render a talk-tutor pro-

gram ineffective and a waste of money.

What are your thoughts about the talk-tutor format? Have you used any talk-tutor programs that you recommend? Reject?

Learning Styles

How people like to learn has been an ongoing subject of research. A pioneer in this research was Dr. Rita Dunn, professor at the Center for the Study of Learning and Teaching Styles at St. Johns University. Dr. Dunn has published many books and articles, and currently oversees the Learning Styles Network.

I am concerned about how children are expected to learn by using a computer. Electronic technology has had an impact on curriculum and schools, but is the impact all positive? Do all children want to work at a computer alone, in a small group, with an adult, a teacher, or even a parent? What about the learner who does not want to work at the computer at all? Jan Hawkins in "Learning Logo Together: The Social Context" written for Banks Street College of Education, discusses the many different ways to organize learning situations.

Two models described by Hawkins concerning group learning environments are the constructivist model, or discovery learning, and collaborative work, children working together to produce a project or accomplish goals. The discovery model lets the learner select his own materials to learn with, while the collaboration assumes that learners work together toward goal accomplishment. The implications for Logo instruction should be apparent: some students would prefer to construct their own graphics, others might prefer to work together.

The Learning Style Inventory (LSI) helps a teacher identify learning characteristics that are important to the learner. There are five stimuli: environmental, emotional, sociological, physical, and psychological. Contained by category in each of the stimuli are elements. For example, the elements in the environmental category are sound, light, temperature, and design. Through the use of the LSI it can be determined if a student prefers to learn in an environment that has plenty of light or dim lighting, warm or cold temperatures, a little sound or absolutely quiet, etc. Each of these characteristics is important and can affect how well a student learns.

In the emotional category are motivation, persistence, responsibility, and structure. In the sociological category are colleagues, self, pair, team, authority, and varied. In the physical category the ele-

Telewriter-64™

the Color Computer Word Processor

- **3 display formats: 51/64/85 columns × 24 lines**
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- **Right justification**
- **Easy hyphenation**
- **Drives any printer**
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- **Runs in 16K, 32K, or 64K**
- **Menu-driven disk and cassette I/O**
- **No hardware modifications required**

THE ORIGINAL

Simply stated, Telewriter is the most powerful word processor you can buy for the TRS-80 Color Computer. The original Telewriter has received rave reviews in every major Color Computer and TRS-80 magazine, as well as enthusiastic praise from thousands of satisfied owners. And rightly so.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads. Telewriter gives the Color Computer a 51 column by 24 line screen display with *true lower case characters*. So a Telewriter screen looks like a printed page, with a good chunk of text on screen at one time. In fact, more on screen text than you'd get with Apple II, Atari, TI, Vic or TRS-80 Model III.

On top of that, the sophisticated Telewriter full-screen editor is so simple to use, it makes writing fun. With single-letter mnemonic commands, and menu-driven I/O and formatting, Telewriter surpasses all others for user friendliness and pure power.

Telewriter's chain printing feature means that the size of your text is never limited by the amount of memory you have, and Telewriter's advanced cassette handler gives you a powerful word processor without the major additional cost of a disk.

...one of the best programs for the Color Computer I have seen...

— Color Computer News, Jan. 1982

TELEWRITER-64

But now we've added more power to Telewriter. Not just bells and whistles, but major features that give you total control over your writing. We call this new supercharged version Telewriter-64. For two reasons.

64K COMPATIBLE

Telewriter-64 runs fully in any Color Computer — 16K, 32K, or 64K, with or without Extended Basic, with disk or cassette or both. It automatically configures itself to take optimum advantage of all available memory. That means that when you upgrade your memory, the Telewriter-64 text buffer grows accordingly. In a 64K cassette based system, for example, you get about 40K of memory to store text. So you don't need disk or FLEX to put all your 64K to work immediately.

64 COLUMNS (AND 85!)

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64 × 24 and 85 × 24!! Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command. The 51 × 24 display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, *all on the screen at one time*. Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.

Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

FEATURES & SPECIFICATIONS:

Printing and formatting: Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminet, etc.).

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dot-graphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

File and I/O Features: ASCII format files — create and edit BASIC, Assembly, Pascal, and C programs. Smart Terminal files (for uploading or downloading), even text files from other word processors. Compatible with spelling checkers (like Spell 'n Fix).

Cassette verify command for sure saves. Cassette auto-retry means you type a load command only once no matter where you are in the tape.

Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

Editing features: Fast, full-screen editor with wordwrap, block copy, block move, block delete, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text; page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

Insert or delete text anywhere on the screen without changing "modes." This fast "free-form" editor provides maximum ease of use. Everything you do appears immediately on the screen in front of you. Commands require only a single key or a single key plus CLEAR.

...truly a state of the art word processor... outstanding in every respect.

— The RAINBOW, Jan. 1982

PROFESSIONAL WORD PROCESSING

You can no longer afford to be without the power and efficiency word processing brings to everything you write. The TRS-80 Color Computer is the lowest priced micro with the capability for serious word processing. And only Telewriter-64 fully unleashes that capability.

Telewriter-64 costs \$49.95 on cassette, \$59.95 on disk, and comes complete with over 70 pages of well-written documentation. (The step-by-step tutorial will have your writing with Telewriter-64 in a matter of minutes.) To order, send check or money order to:

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Or check your local software store. If you have questions, or would like to order by Visa or Mastercard, call us at (619) 755-1258 (weekdays, 8AM-4PM PST). Dealer inquiries invited.

(Add \$2 for shipping. Californians add 6% state tax. Allow 2 weeks for personal checks. Send self-addressed stamped envelope for Telewriter reviews from CCN, RAINBOW, 80-Micro, 80-U.S. Telewriter owners: send SASE or call for information on upgrading to Telewriter-64. Telewriter-compatible spelling checker (Spell 'n Fix) and Smart Terminal program (ColorCom/E) also available. Call or write for more information.)

Apple II is a trademark of Apple Computer, Inc.; Atari is a trademark of Atari, Inc.; TRS-80 is a trademark of Tandy Corp.; MX-80 is a trademark of Epson America, Inc.

ments are perceptual, intake, time, and mobility. The last category, psychological, includes analytical/global, cerebral preference, and reflective/impulsive.

Each of the elements is an important consideration when determining how a student learns. If the elements are classified as a preference or strong preference they must be considered when developing a lesson.

I believe learning styles should be carefully considered when introducing computer education. Does the child prefer to work alone or in a group, can he function responsibly with computer tutorial programs, is the classroom environment appropriate (sound, light and design)? Are the computer programs structured for right- or left-brained learners? Each question could have a serious impact on the future of classroom educational technology. Considerably more research needs to be conducted before submerging ourselves into programs that may not be effective.

Considerable literature is available on learning styles. Feel free to write me at our education address or write: Dr. Rita Dunn, Learning Styles Network, St. Johns University, Grand Central Parkway, Jamaica, NY 11439.

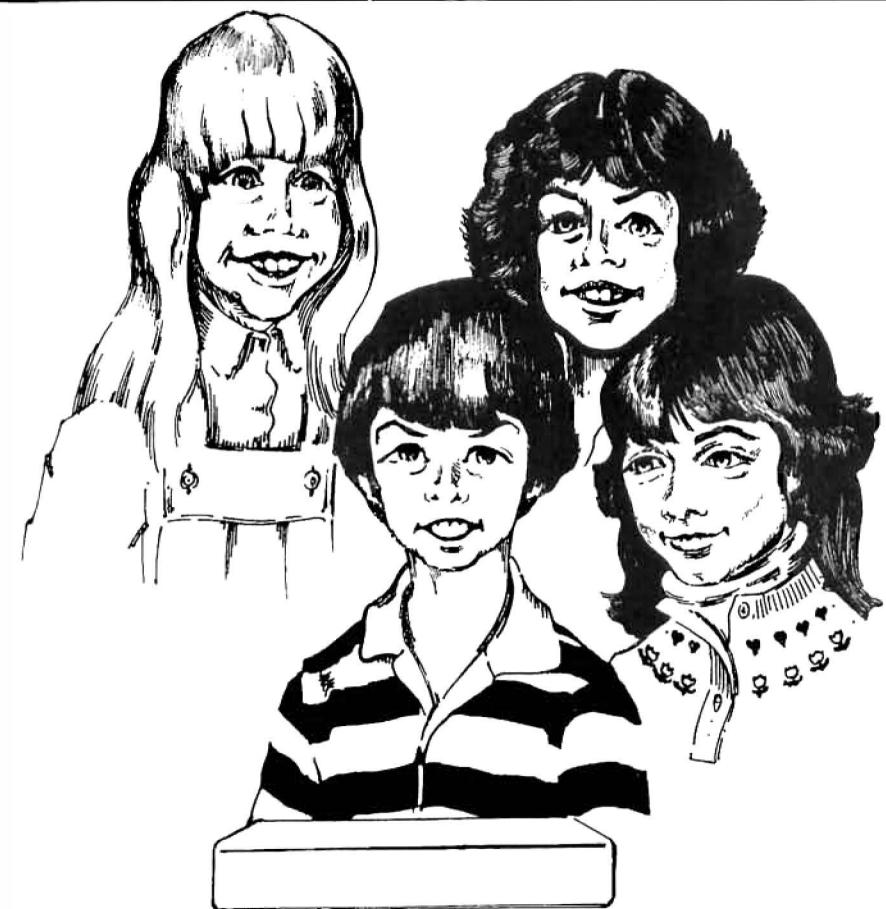
Central Middle School — Amherst, Ohio

A very active and enthusiastic Color Computer user for education is Stephen Demko, principal at Central Middle School. The students and staff at Central are also excited about the many ways the Color Computer can be used for education.

The staff at Central has written to offer us information about using the Network II controller. Their discovery was that there was no "easy way" to change over a slave computer from network control to individual-based control.

To correct this "design" problem, inherent within the Network II system, they developed a very simple and safe way for any student to effectively change a slave computer from Network II control to individual cassette control and then back again. The change-over is accomplished without requiring the student to unplug and plug different cables into the cassette port. At Central Middle School they feel this additional flexibility is a valuable addition to the Network II control system, eliminating premature damage to the computer cassette port.

For more information, feel free to contract Mr. Demko at: Central Middle School, 474 Church Street, Amherst, Ohio 44001, (216)988-4923.



Help

I have received several telephone calls from our readers with some interesting suggestions. One of our readers wonders whether anyone has programs on affective education. Affective education deals with the social aspects of the school program. I recently received a printed copy of a program on behavior in the school cafeteria from one of our readers. The Children's Computer Workshop programs from Radio Shack have affective objectives written into the documentation, but they do not deal directly with affective concepts. I am not familiar with any other programs that deal with affective education.

Another reader is looking for religious education programs. Again, I have not seen any programs in this category either.

Can anyone help?

Maintenance

Now is a good time to perform normal maintenance to your computer, monitor/television, disk drive, printer, and cassette deck. This is one frequently neglected aspect of computer use.

First clean your monitor/television screen with an anti-static cloth and cleaner. The kit is available from your Radio Shack dealer.

Your cassette recorder heads need to be cleaned periodically. Any stereo store can provide you with the necessary items for this project.

Finally, a kit from Falcon Safety Products can be used for your computer, printer, and disk drive maintenance program.

The last suggestion — purchase dust covers for your equipment. Dust is your number one enemy.

Literature

A fine publication is available from Bank Street College of Education. The booklet is a summary of presentations made at a computer meeting in Montreal, Canada in April, 1983. Some of the topics included in the booklet are software design for the classroom, learning configurations for Logo, and computers for composing. The publication is called technical Report 22. There is a small charge.

Information on this booklet and other publications from the college can be obtained from: Bank Street College of Education, 610 West 112th Street, New York, New York 10025.

Don't forget our address: GOTO School, Dr. Paul Kimmelman, P.O. Box 8276, Akron, Ohio 44320.

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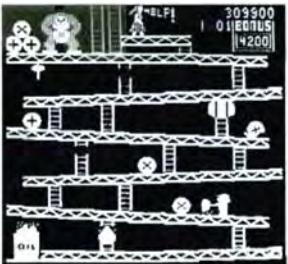
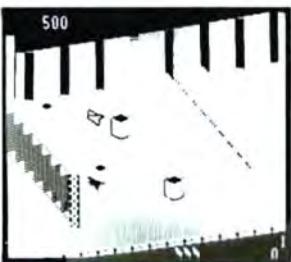


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From Elite Software comes this fantastic arcade style space action game with 3 different stages of moving 3-D graphics. You've never seen anything like this on your CoCo! Great sound too! 32K Tape: \$24.95

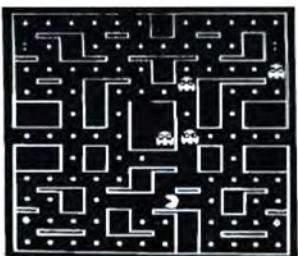
CUBIX

By Spectral Associates. Very much like the arcade smash! Jump little Cubix around the 3D maze trying to change the color of all the squares. With Death Globes, Discs, Snakes, etc. 32K Tape: \$24.95



HOST GOBLER

From Spectral Assoc. This "PAC" theme game has been improved several times. It is definitely the best of its type. Brilliant color, action and sound, just like an arcade. 16K Tape: \$24.95



THE KING

Previously called 'Donkey King', you simply cannot buy a more impressive game for your CoCo. With 4 different screens and loads of fun! From Tom Mix Software. 32K Tape: \$25.95

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JOYSTICK INTERFACE/RAPID FIRE/6 FT. EXTENDER ALL IN ONE! The Colorcade allows connection of any Atari type joystick to your CoCo (including the Wico Red Ball). These switch type sticks are extremely rugged and have a faster and more positive response. They will improve the play of almost any action game.

An adjustable speed rapid fire circuit is built in. Press your fire button and get a great burst of fire instead of just a single shot! You get a real advantage in shooting games that do not have repeat fire.

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CASSETTE... \$49.95



Colorware researched the word processors available for the Color Computer. This is the best. Telewriter-64 is a truly sophisticated system that is marvelously easy to use. It works with any 16K, 32K or 64K system and any CoCo compatible printer.

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Making your computer talk couldn't be any easier! 'Real Talker' is a full featured, ready to use, HARDWARE voice synthesizer system in a cartridge pak. It uses the Votrax SC-01 phoneme synthesizer chip to produce a clear, crisp voice.

FREE TEXT-TO-SPEECH

Included free with 'Real Talker' is Colorware's remarkable Text-to-Speech program. This is a truly powerful machine language utility. What it does is automatically convert plain English to speech. And it has an unlimited vocabulary! For example, use it in the direct mode: Type in a sentence or a paragraph, even mix in numbers, dollar signs, etc., then press enter. The text is spoken. At the same time a phoneme string is generated which can be saved to cassette or disk, modified or used in a Basic program.

We originally planned to sell this major piece of programming for about \$40.00 but decided it was so useful that no 'Real Talker' user should be without it. Besides, it really shows off the capability of 'Real Talker'.

Also included with 'Real Talker' is our unique Phoneme Editor program. It allows you to explore and create artificial speech at the phoneme level. Phonemes are the fundamental sounds or building blocks of word pronunciation. There are 64 different phonemes, as well as 4 inflection levels at your disposal. Creating and modifying speech at the phoneme level is both fascinating and educational. The Phoneme Editor may also be used to customize the pronunciation of speech produced by the Text-to-Speech program.



You don't have to use any of our utility programs though. If you write your own Basic Programs, you will find the pocket sized Votrax Dictionary (included free) is all you need to make your own Basic programs talk. This dictionary gives you quick access to the phoneme sequences used to create approximately 1400 of the most used words in the English language.

How about compatibility? 'Real Talker' is compatible with any 16K, 32K, 64K, Extended or non-extended Color Computer. It works with any cassette or disk based system, with or without the Radio Shack Multi-slot expander. No other synthesizer under \$100 can make this claim. Most other CoCo voice synthesizers require an expensive Multi-slot expander in order to work with the disk system. 'Real Talker' requires only an inexpensive Y-adapter. This is an important consideration if you plan on adding a disk or have one already.

'Real Talker' comes completely assembled, tested and ready to use. It is powered by the CoCo and talks through your T.V. speaker so there is nothing else to add. Price includes Text-to-Speech and other programs on cassette (may be transferred to disk), User Manual and Votrax Dictionary. ONLY \$59.95

'Y-BRANCHING CABLE' For disk systems. This 40-pin, 3 connector cable allows 'Real Talker' to be used with any disk system \$29.95

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SMALL BUSINESS ACCOUNTING (Version 2.0) This sales-based accounting package is designed for the non-accounting oriented businessman. It also contains the flexibility for the accounting oriented user to set up a double entry journal with an almost unlimited chart of accounts. This package includes Sales Entry, transaction driven Accounts Receivable and Accounts Payable, Journal Entry, Payroll Disbursement, and Record Maintenance programs. Screen and hardcopy system outputs include Balance Sheet, Income Statement, Customer and Vendor Status Reports, Accounts Receivable and Payable Aging Reports, Check Register, Sales Reports, Account Status Lists, and a Journal Posting List. The number of accounts is limited only by the number of disk drives. \$89.95

ACCOUNTS RECEIVABLE (Version 2.0) This package is designed to meet the requirements of most small business users. The system includes detailed audit trails and history reports for each customer, prepares invoices and monthly statements, mailing labels, aging lists, and an alphabetized customer listing. The user can define net terms for commercial accounts or finance charges for revolving accounts. This package functions as a standalone A/R system or integrates with the Small Business Accounting package to build a complete accounting/receivables system. \$59.95

PAYROLL (Version 2.0) This integratable package is designed for maintaining personnel and payroll data for up to 200 hourly and salaried employees with 8 deductions each. This system calculates payroll and tax amounts, prints checks and maintains year-to-date totals. These amounts can be automatically transferred to the SBA package for financial reporting. It computes each pay period's totals for straight time, overtime, and bonus pay and determines taxes to be withheld. Additional outputs include mailing list, listing of employees, year-to-date federal and/or state tax listing, and a listing of current misc. deductions. This system is suited for use in all states except Oklahoma and Delaware. \$69.95

All programs require a minimum of 32K and 1 disk drive but will take advantage of 64K and multiple drives. Each package features a hi-res 51 x 24 black on green screen. 16K versions available without hi-res screen. Specify 16K or 32K versions when ordering. Future integrated packages will include: Inventory Control, Sales Analysis, Accounts Payable.

INCLUDE \$5.00 Shipping/Handling Per Order

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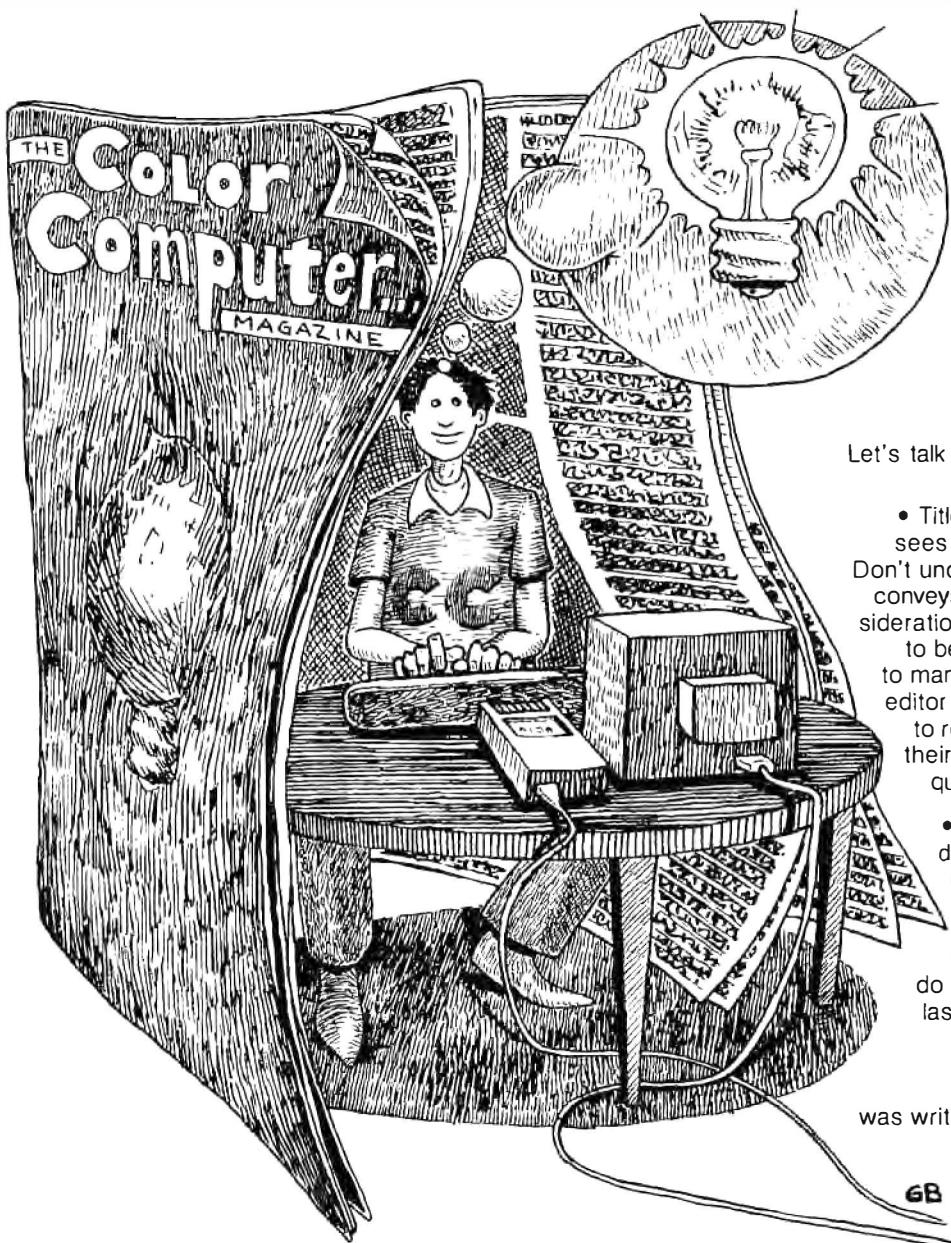


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Getting Published

There's lots you need to know first.



by Mark Sprague

NINETY-NINE PERCENT of all programs submitted to software publishers are rejected. Do you know what publishers look for in a piece of software? Do you know how to choose a publishing house? Do you know what makes a program bad, good, or state-of-the-art? Read on!

A Good Program

Let's talk about the flourishes that make good software into better software.

- Title Screen: The first thing a consumer sees in a new program is the title screen. Don't underestimate the message this screen conveys visually and mentally. Another consideration — if your program is good enough to be published, the publisher will send it to many magazines for review. A reviewing editor will have hundreds of new programs to review every month. If you can't grab their attention right away, the program in question may end up in the reject pile.

- Simplicity of Design and Use: What does that really mean? Take the case of the hypothetical programmer who has spent many months writing and debugging his new arcade game. When his first audience sits down to do battle, they soon discover they can't last more than two seconds before two hundred space pods descend to eat their ship.

The problem is that the program was written without the end-user in mind. No

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PRESENTS

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matter how great your program is, if the average person can't successfully play and win at the first level, he'll soon discard it for something more playable. Reserve difficult skill levels for later in the game, and provide the experienced aracker with an option to go directly to advanced levels.

Utilitarian software exists to perform tedious business tasks easily, or to make life easier for serious programmers. Your package will have a short market life if it is cumbersome and difficult to use. If your program is modular, make sure it is menu driven. The end-user should be able to go anywhere in the program with just a keystroke. You must do all the work for the end-user.

• Options: People do not read documentation until they have thoroughly messed up their newly purchased application, or because they can't figure out how to play the game properly. The author must provide the consumer with a "help" option. The ideal help option provides a one-screen summary of the various commands when a key is pressed. This provides the end-user with enough information to get up and running in a short amount of time.

Another handy option is the "freeze play" key. It's nice to be able to stop playing to answer the phone without relinquishing your position on the forty-third level when you're just about to taste victory for the first time.

About winning: have you spent night after night mastering an arcade game, and finally won...to have nothing happen? Zap! There's a blank screen; maybe a READY prompt; or perhaps a new game prompt. Many people expect a reward for their effort. The reward could be a spectacular graphics display or a reward of rank. There must be a point to the game — some ultimate goal that will satisfy the user.

• First Class Graphics: The buying public no longer wants dull or simple graphics. If you want to compete, your graphics must be state-of-the-art. Indicators point toward games with 3-D graphics as the next big software hole to be plugged. And animation will soon play a bigger role.

• Music: This is an area many people overlook. Music adds to the excitement of a good film or television program; the same holds true for software. Include an option to turn the music off.

• Originality: It seems that just about every concept has been written and re-written. The creative spirit of cooperation must come into play here. Don't be afraid to work with other programmers, artists, or musicians. Some of the best software on the market is produced by development teams.

• State-of-the-Art: Go to major computer shows. The best you see today is state-of-the-art; when you've finished your program six months from now, it may not be! Plan ahead, and make your program better than what the industry is talking about today.

Choosing a Publisher

It's very difficult to tell most software publishers apart. The average software company got its start supporting one, or possibly two systems, and expanded its support to other computers. This means an average company's sales are strong for the computer they made their fortune on, but may be average (or even poor) for other systems. Find out as much as you can about the software firms you are considering. When in doubt, call the company in question and ask! Most companies will tell you where they stand in the market. If they don't, you probably should go elsewhere.

Rejections

- Documentation: This is the second most expensive step in the process of getting a package into the marketplace. If you have written an extensive utility or a business application where documentation is a necessity, poor or non-existent instructions may very well reward your efforts with reduced royalties or a rejection slip. And any program that arrives with no loading instructions, no documentation, and no comment as to what computer it is meant for will be an immediate rejection.

Sit down with a dictionary and check any word you're not sure of. If your grammar is weak, get a friend or English teacher to proof your program. Observe the rules of punctuation!

- Cover Letter: Your letter should explain what the program does, and be sure to tell the publisher how to get through the program with minimum time. For example, if you've written an adventure, send a map and a solution. The reviewing editors do not have a month to devote to any one package. The same is true of business software — don't make the reviewing editors type in a mountain of data. Provide data files for evaluation purposes. These little extras will make the reviewer think kindly of you and your program.

- Disks and Tapes: Programs submitted on tape generally will not load. If you own a disk system always submit your program on disk. Disk-based programs are generally trouble free. Tapes are delegated to the end of a reviewing pile. While you are trying to save money on media, you may have earned a rejection slip because of that injudicious tape.

- Coin-Op Copies: No noteworthy software company will publish exact copies of current arcade hits without securing licensing rights first. Converting a popular arcade game for microcomputers can be useful because it will show the publisher what you can do. There is plenty of conversion work to go around, but don't expect to get any of it if you don't show what you can do.

The Publisher

First-class software usually comes in a package carrying four-color artwork and a printed documentation booklet; the product of a coordinated group effort of artists, writers, managers, typesetters, paste-up artists, printers, photographers, and proofreaders. It takes time and talent to put together such a package. How much time should it take?

What is considered an average time frame from start to finish?

Programs have taken from six months up to two years to be released. On the average, game documentation takes ten weeks to write, proof, paste-up, typeset, and print. More sophisticated software (business) will take from four to eight weeks longer. The four-color packages are produced in two phases. The first phase usually takes about six weeks. After the design phase, the people who actually produce the package will require four to six weeks. Under the best possible conditions it will take about three months for a first-rate publishing company to get your product out the door and make it look professionally done. The software industry is far too competitive: retail stores demand standardized packages as well as first-class artwork to attract customers.

Many publishers accept far too many packages for publication; before they know it, six to twelve months have gone by and the product is still not out the door. To keep this from happening to you, call every couple of weeks to check on your program's progress. Ask if the art work has been commissioned. Has the documentation been started? When is the projected release date? If your contact doesn't know the answers, make sure they look into the matter and call you back with some answers.

The range of royalty rates in this industry is staggering. It can be from two to three or up to 20 to 30 percent. I've heard of cases where the publisher and author split profits after meeting expenses. How can an author know where reasonable expenses end?

Five percent of a company that sells ten million dollars a year in software is better than twenty percent of four hundred thousand dollars annual sales. The royalty rate you are offered should be only part of the reason you accept a contract. Does the company advertise extensively? Does the publisher's distribution network cover just southwest Texas or the whole world? What other benefits besides royalties are provided? Does the company go to computer shows? Were they selling tires last year and software this year? It's up to you to make an intelligent choice based on information. The highest royalty rate will not necessarily bring you the highest return.

If you don't take the time to educate yourself to the dynamics of software publishing, and fail, you have no one to blame but yourself. The effort to keep abreast of what is going on in the industry doesn't take as much time as you put in that piece of unpublished software.

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DOWNLOAD "SIG"

by Wayne Day



THERE'S AN INTERNATIONAL Color Computer club that boasts over 6,300 members. The club has no dues, meets almost 24 hours a day, seven days a week, and has one of the largest collections of public domain software in existence for the Color Computer. Members can get together for teleconferences on a special subject, or just browse through reviews of some of the latest software.

The "club" is actually known as the Color SIG, and is available only through the facilities of the CompuServe Information Service.

I will take you on an extensive tour of the Color SIG, to get you acquainted with the service if you're not already a CIS subscriber, and to help you use the service more efficiently. We'll also be taking a look at some of the topics of discussion on the SIG, and a general look at telecommunications and the Color Computer.

Compu-What?

CompuServe is a commercial time-sharing system of computers, headquartered in Columbus, Ohio. Through its Information Service (CIS) it provides electronic news and information on a subscription basis to anyone with access to a telephone and a terminal or a personal computer with the appropriate software. Although most users of CIS are in the United States and Canada, CIS customers around the world sometimes access the system.

CompuServe maintains its own communications network with access numbers throughout the United States. Additionally, both the GTE Telenet system and the Tymshare system can input into CompuServe. In Canada, Datapac provides the common carrier network services to the CIS computers in Ohio. There are very few locations in North America not within a local telephone call to a CompuServe access point.

A CIS customer will find information of various types and categories. Many programs on the CIS are designed to be electronic newspapers, such as the "Tandy Newsletter," maintained by Radio Shack, while other programs on the system let you access the latest official weather information across the country, search through specialized electronic encyclopedias, or participate in one of the many Special Interest Groups (SIG) found on the system, such as the Color SIG.

Getting Involved

To access CIS (as well as any of the other electronic information outlets, including bulletin board systems) you'll need two additions to your Color Computer: a modem (a modulator-demodulator), and a software package designed to turn your computer into a terminal (sending and receiving ASCII data).

Radio Shack carries a complete software package for the Color Computer, including a terminal program and a CIS starter package. Any terminal program for the Color Computer will let you ac-

cess CIS (and, by default, any other BBS or information service). Some of the "third-party" terminal programs have features that make them highly desirable for Color Computer owners (these features will be discussed in later months). On the other hand, the Videotex software for the Color Computer, sold by Radio Shack, also has some advantages, as well as being readily available in almost every Radio Shack store.

Let's assume you now have a modem, a cable to connect the modem to your Color Computer, and the Videotex CIS/Dow Jones starter package.

The Color SIG is located on page PCS-126 on the CIS. Once you've entered the CIS system, issue the command G PCS-126 (which translates to "Go to page 126 of the Personal Computing Services") to gain access to the SIG.

Once There

Once into the SIG, you'll be presented with a variety of options. Many will be familiar if you have used a local BBS (Bulletin Board Service) before. Some are possible only on a large system such as the CIS.

Since the Color SIG operates in a multi-user environment, meaning that more than one person can be on the system at one time, the possibilities for teleconferencing are unlimited. The Conference mode lets any SIG user "talk" to any other in real time; what you type may be viewed by any other user on the Conference mode at the same time. It's just as simple as a telephone party line. We have used this feature to have conferences on machine language programming, hosted by Bill Barden (*the assembly language authority for the Color Computer*), a conference that dealt with both sides of the software protection debate, as well as a conference for SIG newcomers. More conferences are scheduled in the future.

The message base of the SIG is quite popular, and can be likened to a bulletin board in most BBS systems. Users post messages and replies, the only limitations being that commercial messages and outright profanity are not allowed.

When the SIG was formed, it was decided commercial messages would not be allowed, thus ensuring that the SIG would not become an advertising forum where users would have to wade through commercials to get to the "good" information. There is a section of the message sections set aside for personal want ads, though, and those private party messages are encouraged.

The SIG also has a very large database of Color Computer programs, text files,

and software reviews, available for downloading by SIG members. These files are submitted by individual SIG users for the benefit of other members of the SIG, and range from simple Basic programs to an elaborate method of playing four-part harmony music on the Color Computer (with quite a few melodies pre-programmed so you get a complete music library from the start).

One of the advantages of a public domain program library is that Color Computer users around the world have access to the collective works of software. In some cases these works are superior to the products being marketed. Also, the writer of the program can be contacted through a message on the SIG, to suggest a program change or to get assistance making a program work.

Sometimes the programs are derived from a group effort, such as the program called DOS64.CC. Designed to work with 64K computers, DOS64.CC modifies the Basic interpreter of the Color Computer to add automatic repeat keying, automatic line numbering, lowercase command input, and a host of other features. It has been modified many, many times by different SIG members, and each revision adds just a bit more to the final program.

SIG members range from the very newest Color Computer owners to some folks who have been involved in Color Computing since the start. There are doctors, lawyers, and computer professionals who are SIG members, as well as students, housewives and most other occupational categories. There are experts on assembly language programming, hardware modifications, and users who are quite adept with the Flex operating system, as well as users who are just beginning to understand how Basic works. We expect the new OS-9 operating system will be gathering a lot of interest on the SIG, too.

The Color SIG is probably not unlike your local Color Computer club... just a bit more varied and powerful. But with the advent of telecommunicating, the SIG is just a phone call away.

You can get a demonstration of the CompuServe Information Service at your local Radio Shack Computer Center, as well as many Radio Shack stores. They also have information on how to subscribe, and the current rates for subscription. And be sure and ask them to show you the Color SIG while you're checking out the CIS!

Next month, we'll begin our in-depth look at the Color SIG, with a look at the message database and how to use it, plus a look at some of the information files available on the SIG.

■ ■ ■

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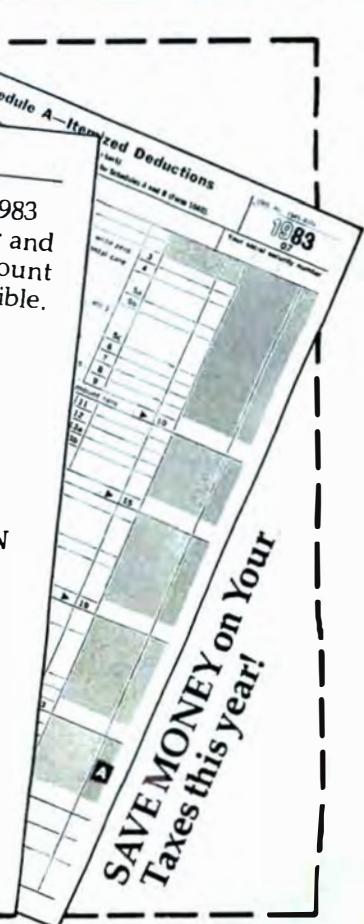
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SORCERER'S

SUNFLOWER HAULED POKE to the top of a rocky escarpment on a sheer line of cliffs high in the blue mountains west of the castle. "Now that we've overcome the Questigians' traps, we should have no trouble finding the Sorcerer," she said.

"We'll rescue him from those kidnappers for sure," said Poke. "I'm just beginning to get strong."

"Shh, listen!" Sunflower said. They fell silent. It first seemed to be the wind, but with concentration they made out the unmistakable sounds of a hurdy-gurdy. It lay ahead, across a field of sneezewort and beyond a line of wizened trees.

PUZZLES

by Richard Ramella

*Enjoy this set of puzzles
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ARCADE ACTION GAMES



They crept across a mossy fen, and through the thickets saw extravagant colors and sweeping movement. "Maybe they're getting ready for a torture ceremony," Poke whispered.

"Hello," came a voice.

"Arghh!" yelled Poke.

"Take it easy, lad," said Sorcerer Goldberg, who had appeared behind them as if, well, as if by magic.

"You're free!" said Sunflower. "Let's run before they come after us."

The Sorcerer only smiled.

"Bob said you'd been kidnapped," Poke said. (Bob is the Sorcerer's twisted major-domo.)

The Sorcerer explained, "The Questigians think they've kidnapped me, but it's hardly the case. Bob fantasizes a lot; he'd like to have the castle to himself."

"Then what happened?" Sunflower asked.

"Every year the Questigians come after me, and I let them take me away. You see, this is the season of the Questigian Quiz. Carnival time."

"That sounds like fun!" Poke said.

"I knew I could depend on Bob to fill your ears with nonsense to get you up here for the carnival," the Sorcerer chuckled.

When it was explained to the boy and the girl that Questigians were harmless, though seemingly bellicose in nature, Poke and Sunflower strode onto the carnival rounds without fear. "They're just like every little bad child in the world," said the Sorcerer, "all they want is attention and love."

Their snouts quivering with interest, a score of the squat Questigians crowded around the humans.

"If you don't play my game Bone Race," said one, "I'll punkh you in the breadbasket!"

"Me!" yelled another. "I'll turn your ears upside down if you don't try Alley Oops! Immediately!"

"I'll...I'll..." tried another. "Anyway, my game's Questigian Torture."

"Torture can be fun," said a fourth Questigian, "but you'll really like Circles and Discs or I'll make your nose two feet long and tie it in a granny knot."

"We're severely frightened," said the Sorcerer, and this produced an excited murmur of content among the short creatures. "We'll play all the games in absolute mortal fear for our very lives."

The Questigians cheered.

"Come on," said the Sorcerer, striding toward the colorful tents housing games of skill. "The puzzles are quite clever."

Bone Race

The "bone" of the title (Color Basic

4K) refers to dice. A playing board of 15 cells is drawn and an orange player piece is placed in the first cell. The first object is to reach the last or next to last cell by tapping the letter F for forward, which produces dice rolls and automatic moves. If the total of the two dice takes the player past the last cell, the Questigian wins the round. Three times during a round, the player may move backward as many spaces as desired, though of course not past the first cell. The ultimate object is to find the strategy that should produce more winning than losing rounds.

Alley Oops!

Four connected alleys (Color Basic 4K) are drawn. The three vertical alleys have three numbers in each, and the horizontal alley has an orange cursor that can be moved through the network by tapping arrow keys. You score points by covering a number with the orange cursor. The first number covered counts one time its value, the second two times its value, and the third three times. Object: Get a score of exactly 50. At the end of a round you will be shown your total briefly and the game will go to the start of another round. If a score of 50 is not attained in 10 rounds, the program ends. A winning total is acknowledged.

Questigian Torture

An 8 by 8 grid (Extended Color Basic) is drawn. One cell is blue and is the starting point. Another is orange and is the ending point. All others are white. Use arrow keys to travel to all white cells, which turn blue as you go, and enter the orange cell last. Once each game you may make a diagonal move. To enter diagonal mode, you must not be in any

row along the edge of the grid. Then tap D for diagonal. A green text screen will appear with instructions on how to move by typing two-letter codes (NE for northwest, etc.). From this mode, the grid may be briefly seen by tapping the Enter key, and your position will be marked in green. A diagonal move must be made into a white cell or there is no effect. Beware of boxing yourself in, and know this puzzle is always beatable.

Circles and Discs

An orange circle (Extended Color Basic) is drawn. Look closely towards the extreme west of the circle and you will see a flashing cursor; it may be moved by holding down any of the arrow keys. Move the cursor to any position desired and tap D for draw. A smaller blue circle will be drawn. You may draw five blue circles in the attempt to completely cover the orange circle. After the fifth move the program ends but keeps the result of your moves. The program does not recognize a winning effort, but the player will.

64 Witches Solution

In September's (1983) Sorcerer's Puzzles, a game called 64 Witches was presented. For all who have tried it, the following solution by Stephen Collins of Newark, OH, scores 5, far better than achieved by the Sorcerer himself:

17465302
02534617
64712035
30256174
26370451
51043026
73621540
45107263



4K Color Basic

Program Listing. Bone Race

```
100 REM * BONE RACE * TRS-80 COL
OR BASIC 4K
110 REM * SORCERER'S PUZZLES #5
* RICHARD RAMELLA
120 CLS(0)
130 FOR X=0 TO 60
140 SET(X,Y,5)
150 SET(X,Y+4,5)
160 IF X/4=INT(X/4) THEN FOR Z=Y
TO Y+4: SET(X,Z,5): NEXT Z
170 NEXT X
180 FOR A=1 TO 32
190 Z$=Z$+CHR$(143)
200 NEXT A
210 GOSUB 520
```

more

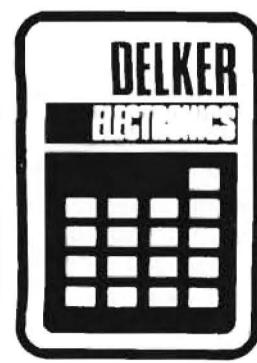
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```

220 PRINT Z$
230 X=2
240 L=0
250 Y=2
260 SET(X,Y,8)
270 G=1
280 A$=INKEY$
290 IF A$<>"B" AND A$<>"F" THEN
280
300 PRINT @ 130,"";
310 IF A$="B" GOSUB 560: GOTO 28
0
320 PRINT "FORWARD: ";
330 W=RND(6)
340 GOSUB 720
350 E=RND(6)
360 Q=W+E
370 PRINT "DICE" W "+" E"
380 GOSUB 720
390 FOR K=X TO X-1+(Q*4) STEP 4
400 SET(K,Y,8)
410 FOR T=1 TO 150
420 NEXT T
430 N=N+1
440 IF K=62 GOTO 750
450 RESET(K,Y)
460 NEXT K
470 SET(K,Y,8)
480 IF K>50 GOTO 750
490 X=K
500 GOSUB 520
510 GOTO 280
520 FOR A=128 TO 224 STEP 32
530 PRINT @ A,Z$;
540 NEXT A
550 RETURN
560 L=L+1
570 IF L>3 THEN PRINT "CAN'T DO
IT": FOR T=1 TO 15: SOUND RND(13
)*8,1: NEXT T: GOSUB 520: RETURN

580 PRINT "BACKWARD - TIME";L
590 INPUT "HOW MANY";R
600 RESET(X,Y)
610 FOR K=X TO X+1-(4*R) STEP -4
620 IF K=2 THEN X=2: SET(X,Y,8):
GOSUB 520: RETURN
630 SET(K,Y,8)
640 FOR T=1 TO 150
650 NEXT T
660 RESET(K,Y)
670 NEXT K
680 X=K
690 SET(X,Y,8)
700 GOSUB 520

```

```

710 RETURN
720 FOR T=1 TO 500
730 NEXT T
740 RETURN
750 PRINT @ 194,"";
760 IF K>58 THEN PRINT "LOSE.";;
770 IF K=54 OR K=58 THEN PRINT "WIN";: FOR T=1 TO 4: SOUND 176,1
: SOUND 193,1: SOUND 204,1: SOUND 218,1: NEXT T: P=P+1
780 PRINT @ 258,"SCORE: YOU:"P" M
E:"M;
790 GOSUB 720
800 GOSUB 720
810 GOSUB 520
820 RESET(62,Y)
830 RESET(K,Y)
840 GOTO 230
850 END
    ■■■

```

Program Listing. Alley Oops!

```

100 REM * ALLEY OOPS! * TRS-80 COLOR BASIC 4K
110 REM * SORCERER'S PUZZLES #5
* RICHARD RAMELLA
120 QQ=10
130 CLS(3)
140 G=0
150 M=256
160 S=1024
170 B$=CHR$(128)
180 L$=CHR$(8)
190 R$=CHR$(9)
200 D$=CHR$(10)
210 U$=CHR$(94)
220 P$=CHR$(255)
230 Z$=CHR$(128)+CHR$(128)
240 FOR A=42 TO 202 STEP 32
250 PRINT @ A,Z$;
260 PRINT @ A+4,Z$;
270 PRINT @ A+8,Z$;
280 NEXT A
290 FOR A=232 TO 244 STEP 2
300 PRINT @ A,Z$;
310 NEXT A
320 PRINT @ 42,"8";
330 PRINT @ 46,"7";
    • more

```

PRO-COLOR-SERIES

PRO-COLOR-FILE Enhanced

\$79.95 D

This high level data base development program offers the ability to track any type of information. From Mailing Lists to Expense Records, to Inventory or Court Trials, PRO-COLOR-FILE has the versatility to handle it.

60 Data fields	8 Report formats
Upto 1020 Bytes per record	Summary Reports
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4 Color Data Entry Screens	Page titles, numbering
28 User defined Equations	Sort on any Field
Scan File Alphabetically	Sort 3 Fields at once
Duplicate records	Sort any size file
Duplicate fields	Select sub-sets of file

See Reviews in:

Color Computer News -- June 83

Hot CoCo - August 83

Rainbow Magazine - June 83

PRO-COLOR-FORMS

*** NEW ***

\$39.95 D

Generate customized letters by merging PRO-COLOR-FILE data files with a letter. Print a personalized letter to everyone on your list. PRO-COLOR-FORMS will place data anywhere on a full page, even within the text of a letter.

Embedded control codes
6 User designed forms

32 to 133 characters
7 to 66 lines

Have your data printed on pre-printed forms or design your own. Requires PRO-COLOR-FILE to use.

PRO-COLOR-DIR

*** NEW ***

\$24.95 D

Compile a master listing of all your directories in one data file. This utility program will read a diskette's directory and place the information in one master file. PRO-COLOR-FILE is then used to generate reports or search and update. PRO-COLOR-DIR will store:

Diskette ID name	Date Created
File name/Extension	Date Updated
File type (Basic, ML, Data)	Number of Grans allocated
Number of Sectors allocated	Number of Sectors used
ML Load and Execute address	ML file length

Store 1000 entries! Requires PRO-COLOR-FILE to use.

See your local dealer or send check or money order to:
Derringer Software, P.O. Box 5300, Florence, SC 29502
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Add \$2.00 for Shipping and Handling No C.O.D.'s

PRO-COLOR-FILE, PRO-COLOR-DIR,
PRO-COLOR-FORMS (C) 1983
Derringer Software
All programs require 32k Color Computer Disk System
(Does not require joysticks!)

```

340 PRINT @ 50,"9";
350 PRINT @ 106,"9";
360 PRINT @ 110,"10";
370 PRINT @ 114,"7";
380 PRINT @ 170,"7";
390 PRINT @ 174,"8";
400 PRINT @ 178,"10";
410 A=232
420 PRINT @ A,P$;
430 X$=INKEY$
440 IF X$<>U$ THEN 460 ELSE F=PE
EK(S+A-32):IF F<>175 AND F=128 T
HEN PRINT @ A,Z$;;: A=A-32
450 IF F<>128 AND F<>175 GOSUB 5
00
460 F=PEEK(S+A+2): IF F<>175 AND
X$=R$ THEN PRINT @ A,Z$;;: A=A+2
32
470 F=PEEK(S+A-2): IF F<>175 AND
X$=L$ THEN PRINT @ A,Z$;;: A=A-2
480 F=PEEK(S+A+32): IF F<>175 AN
D X$=D$ THEN PRINT @ A,Z$;;: A=A+
32
490 GOTO 420
500 PRINT @ A,Z$;
510 A=A-32
520 PRINT @ A,Z$;
530 PRINT @ A,P$;
540 M=M+32
550 Q=Q+1
560 F=F-112
570 IF F=1 THEN F=10
580 F(Q)=F
590 PRINT @ M,"TURN"Q;
600 G=G+(Q*F)
610 G(Q)=G
620 IF Q<3 THEN RETURN

```

```

630 IF G>>50 GOTO 770
640 PRINT @ 295,1"X" F(1)"= "F(1)
;" TOTAL - "F(1)
650 PRINT @ 327,2"X" F(2)"="2*F(2
)" TOTAL - "G(2)
660 PRINT @ 359,3"X" F(3)"="3*F(3
)" TOTAL - "G(3)" ";
670 PRINT @ 458,"RATING:";QQ;
680 PRINT @ 424," W-I-N-N-E-R "
;
690 GOSUB 730
700 PRINT @ 424," W-I-N-N-E-R "
;
710 GOSUB 730
720 GOTO 680
730 SOUND 204,1
740 SOUND 193,1
750 SOUND 218,1
760 RETURN
770 PRINT @ 300,"LOSER ";
780 PRINT @ 332,"TOTAL"G;
790 GOSUB 890
800 PRINT @ 396,"TRY AGAIN ";
810 Q=0
820 G=0
830 GOSUB 890
840 FOR T=1 TO 1000
850 NEXT T
860 QQ=QQ-1
870 IF QQ=0 THEN PRINT @ 416,"RA
TING ZERO. THAT'S ALL.": END
880 GOTO 130
890 FOR T=1 TO 20
900 SOUND RND(8)*13,1
910 NEXT
920 RETURN
930 END

```

■ ■ ■

Program Listing. Questigian Torture

```

100 REM * QUESTIGIAN TORTURE * T
RS-80 EXTENDED COLOR BASIC *
110 REM * SORCERER'S PUZZLES #5
* RICHARD RAMELLA
120 CLS
130 PRINT @ 128,"";
140 PCLS
150 PMODE 3,1
160 SCREEN 1,1
170 U$=CHR$(94)
180 D$=CHR$(10)
190 L$=CHR$(8)
200 R$=CHR$(9)
210 FOR Y=0 TO 192 STEP 24
220 LINE(0,Y)-(192,Y),PSET
230 NEXT Y
240 FOR X=0 TO 192 STEP 24
250 LINE(X,0)-(X,192),PSET

```

```

260 NEXT
270 A=RND(2)
280 IF A=1 THEN X=74 ELSE X=50
290 PAINT(X,50),3,8
300 PAINT(122,122),8,8
310 Y=50
320 Z$=INKEY$
330 IF X>25 AND X<147 AND Y>25 A
ND Y<147 AND Z$="D" AND SS=0 GOS
UB 630
340 IF Y=2 THEN 350 ELSE IF Z$=U

```

more

For the answers or strategies for these puzzles, send a 20 cent stamped and self-addressed envelope to Sorcerer's Puzzles, The Color Computer Magazine, Highland Mill, Camden, ME 04843. From outside the U.S., send a self-addressed envelope and coin of your nation equal to the amount of stamps on outgoing letter. Cheerful, free advice also given on problems you have with these programs.

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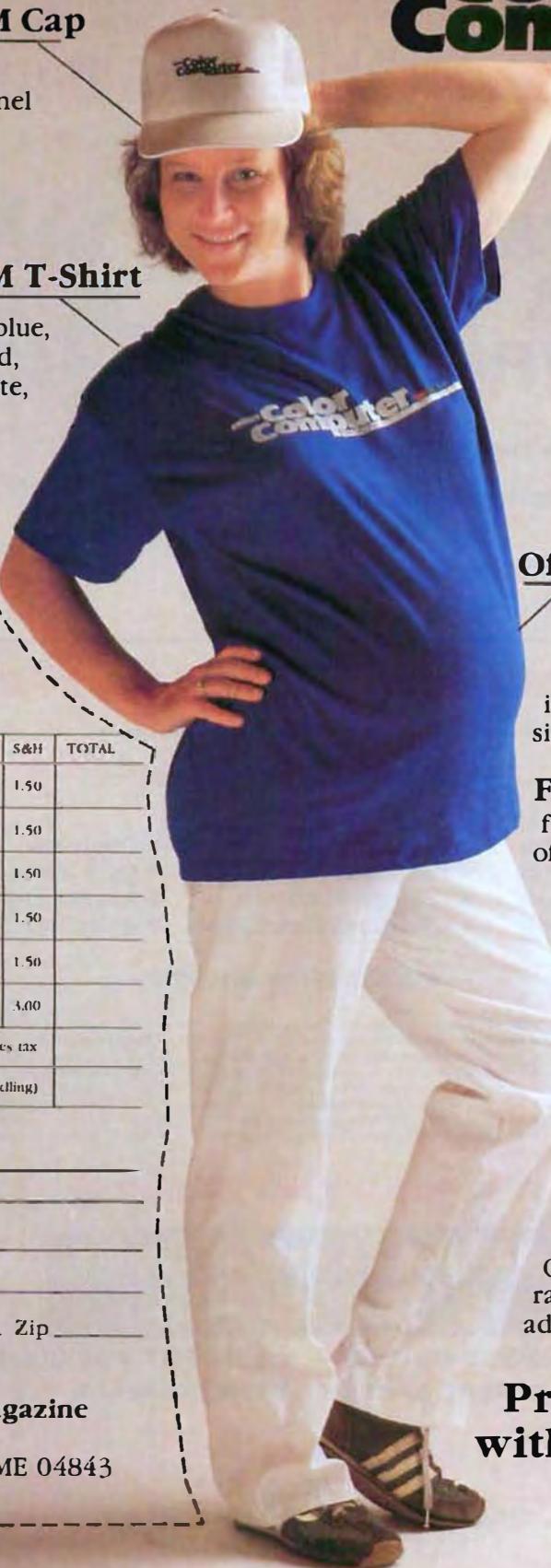
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Enter 18 on TeleResponse page 129

```

$ AND PPOINT(X,Y-24)>>7 THEN Y=Y
-24: N=N+1
350 IF Y=170 GOTO 360 ELSE IF Z$=
=D$ AND PPOINT(X,Y+24)>>7 THEN Y
=Y+24: N=N+1
360 IF X=2 GOTO 370 ELSE IF Z$=L
$ AND PPOINT(X-24,Y)>>7 THEN X=X
-24: N=N+1
370 IF X=170 GOTO 400 ELSE IF Z$=
=R$ AND PPOINT(X+24,Y)>>7 THEN X
=X+24: N=N+1
380 H=PPOINT(X,Y)
390 IF H=8 AND N<63 GOSUB 420 EL
SE IF H=8 AND N=63 GOSUB 530
400 PAINT(X,Y),3,8
410 GOTO 320
420 FOR T=1 TO 500
430 NEXT
440 PRINT "YOU ARRIVE AT ORANGE
TOO SOON."
450 PRINT
460 PRINT "L-O-S-E-R"
470 GOTO 480
480 FOR T=1 TO 3000
490 NEXT
500 SCREEN 1,1
510 SOUND RND(13)*8,1
520 GOTO 510
530 FOR T=1 TO 1000
540 NEXT T
550 PRINT "YOU DID IT!"
560 PRINT
570 PRINT "W-I-N-N-E-R"
580 FOR T=1 TO 3000
590 NEXT T
600 SCREEN 1,1
610 PLAY STR$(RND(6)*2)
620 GOTO 610
630 CLS
640 SS=1
650 PRINT "YOU MAY HAVE ONE DIAG
ONAL MOVE."
660 PRINT "CHOOSE:"
670 PRINT "SW -- SOUTHWEST"
680 PRINT "SE -- SOUTHEAST"
690 PRINT "NW -- NORTHWEST"
700 PRINT "NE -- NORTHEAST"
710 PRINT
720 PRINT "TO VIEW BOARD, POSITI
ON MARKED, TAP ENTER"
730 INPUT K$
740 IF K$="" THEN PAINT(X,Y),2,8
: SCREEN 1,1: FOR T=1 TO 1500: N
EXT T: CLS: PAINT(X,Y),3,8: GOTO
630
750 IF K$="SE" AND PPOINT(X+24,Y
+24)=5 THEN Y=Y+24: X=X+24: GOTO
800

```

```

760 IF K$="SW" AND PPOINT(X-24,Y
+24)=5 THEN Y=Y+24: X=X-24: GOTO
800
770 IF K$="NE" AND PPOINT(X+24,Y
-24)=5 THEN Y=Y-24: X=X+24: GOTO
800
780 IF K$="NW" AND PPOINT(X-24,Y
-24)=5 THEN Y=Y-24: X=X-24: GOTO
800
790 IF K$<>"NE" AND K$<>"NW" AND
K$<>"SE" AND K$<>"SW" THEN CLS:
PRINT "TRY AGAIN -- NW NE SW SE
": FOR T=1 TO 1500: NEXT T: CLS:
GOTO 630
800 CLS
810 SCREEN 1,1 | 830 RETURN
820 N=N+1 | 840 END ■■■

```

Program Listing. Circles and Discs

```

100 REM * CIRCLES AND DISCS * TR
S-80 EXTENDED COLOR BASIC *
110 REM * SORCERER'S PUZZLES #5
* RICHARD RAMELLA
120 CLS
130 PRINT @ 232,"CIRCLES AND DIS
CS";
140 FOR T=1 TO 1000
150 NEXT T
160 PMODE 3,1
170 PCLS
180 SCREEN 1,1
190 CIRCLE(128,96),60
200 PAINT(128,96),4
210 Y=96
220 X=69
230 FOR A=1 TO 5
240 IF Y>36 AND (PEEK(341)AND8)=
0 THEN Y=Y-2
250 IF Y<156 AND (PEEK(342)AND8)=
0 THEN Y=Y+2
260 IF X>69 AND (PEEK(343)AND8)=
0 THEN X=X-2
270 IF X<189 AND (PEEK(344)AND8)=
0 THEN X=X+2
280 Z=PPOINT(X,Y)
290 PSET(X,Y,2)
300 FOR T=1 TO 100
310 NEXT T
320 PSET(X,Y,Z)
330 IF INKEY$<>"D" GOTO 240 ELSE
CIRCLE(X,Y),38,3: PAINT(X-17,Y)
,3: PAINT(X+17,Y),3: PAINT(X,Y-1
7),3: PAINT(X,Y+17),3
340 NEXT A
350 GOTO 350
360 END ■■■

```

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Adds two more 8 line ports with control lines for printers and other devices
6. **EPROM PROGRAMMER**
Has ability to read and/or program the following EPROMS: MCM 68766 MCM68764 MCM68732 MCM2532 2764 2732 2716 2716 type EPROMs may be plugged into the 2K RAM sockets if desired
7. **8 SWITCH CLOSURE DETECTORS**
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8. **DISK COMPATABLE**
9. **ASYNCHRONOUS COMMUNICATIONS INTERFACE ADAPTER**
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10. **SOFTWARE CONTROL**
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11. **40 PIN SOCKET WITH ALL COCO LINES AVAILABLE**
12. **FUNCTION GENERATOR WITH SINE-TRIANGLE-AND SQUARE WAVE OUTPUTS**
13. **SOFTWARE CONTROL**
Over routing of signal sources to the computer sound input to allow extensive sound generation possibilities--either or both D/A's may be used to software generate attack decay etc. and a phase locked loop provides precise frequency control over the sine-triangle-square generator
14. **SOFTWARE CONTROL**
Of RAM bank select for machine with 32K to allow selection of the other 32K bank-machine language programs may be placed in MIM's RAM or 2716 EPROM's, allowing full use of the computer's 65536 bytes of RAM for date, graphics, etc. -- software control of a hardware bank select in MIM can provide almost as much memory to BASIC users
15. **SOFTWARE CONTROL**
Of interrupts from VIA PIA ACIA and A/D
16. **ZERO CROSSING DETECTOR**
To allow use of VIA to count, measure frequency, use other inputs for phase locked loop control, etc.
17. **FULLY BUFFERED**

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Study musical wave forms, modify them and make your own music. Don't like the way BASIC does something? Load it into RAM, change it and program your own version on an EPROM!

Create games using six players and the extensive sound capabilities of MIM. Write games using six players and the extensive sound capabilities of MIM. Create an 8 channel storage oscilloscope and save the results on disk or print them on the printer or a plotter.

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Design a software controlled phase locked loop signal generator, frequency meter, volt meter, storage oscilloscope all in one system!

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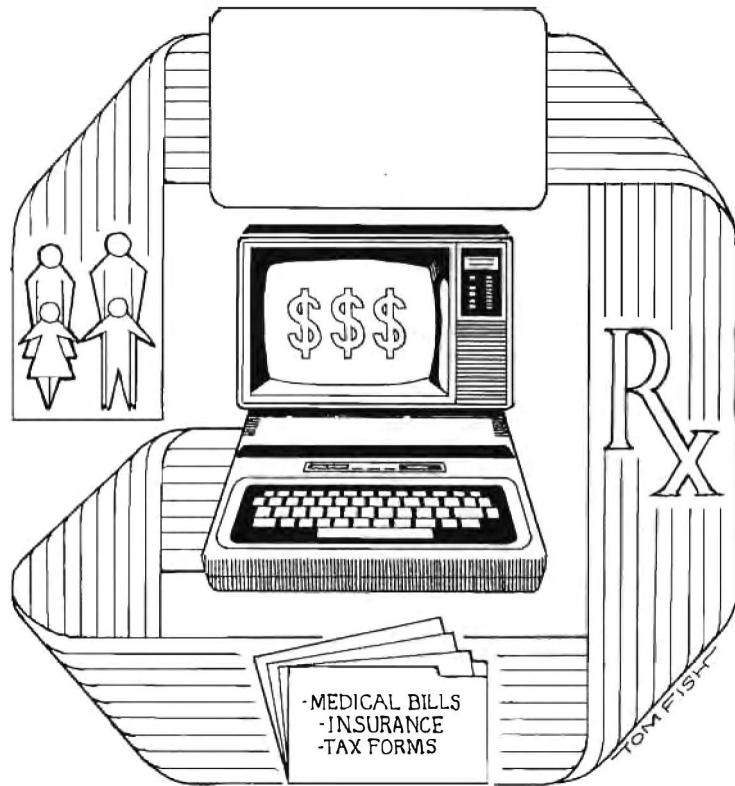
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Extended Basic, by PCLEARING all but one of the graphics pages.

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ONCE THE APPETITE of the IRS has been satisfied each year, most of us relax and forget about all our April resolutions to keep better records. My program, Medical Records, not only can help you deal with the IRS, but also can help keep track of your family medical expenses and insurance reimbursements throughout the year. Those of you who have deductible amounts that must be met by one or more family members before insurance claims can be filed will also find this program useful.

The program will accept up to 150 medical bills and can be updated at any time. Names of family members must not exceed eight letters, and amounts entered are limited to less than \$1000 per entry. In our family we sometimes use nicknames, and an amount over \$1000 may be broken down into two or more entries. The program runs nicely on 16K

by John A. Duling

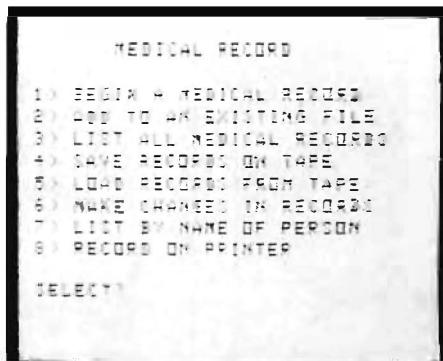


Photo 1. Medical Records Menu

When you Run the program, a menu is displayed with eight items from which to select (see Photo 1). The first item sets up the initial file and allows a one-time entry of the current year. The second menu item permits entry of data relating to the medical expense. I usually enter these about once a month, directly from my checkbook records (see Photo 2a). The entries include: the first name of the family member; the name of the doctor or medical service (drugs, hospital, glasses, etc.); the date of the expense (in format MM/DD); the amount paid; and the amount of any insurance reimbursement. The latter can be entered when reimbursement is received.

Menu item three displays all medical records on file for the family (see Photo 2b). It also provides a total of the amount spent, total insurance received, and balance (this is the figure you may usually deduct on your tax return). Menu item four stores the data on a cassette tape, and item five retrieves it for updating. Item six lets you correct any errors, or enter insurance reimbursements when they are received. Item seven provides a

list of medical expenses for individual family members (see Photo 2c), and item eight activates the printer (for those of us who feel we must have a print-out for our files).

Sometimes it is helpful to have a record of insurance claims that have been submitted, but for which payment has not yet been received. This can be accomplished by adding a symbol such as an asterisk or slash mark behind the ex-

isting entry in the Service column. When the reimbursement is received, the symbol can be removed and the reimbursement amount entered.

The 32-character screen on the Color Computer does not allow individual insurance receipts to be displayed when records for the entire family are viewed; however, these data items are available when viewing records of individual family members, or when using the printer.



Program

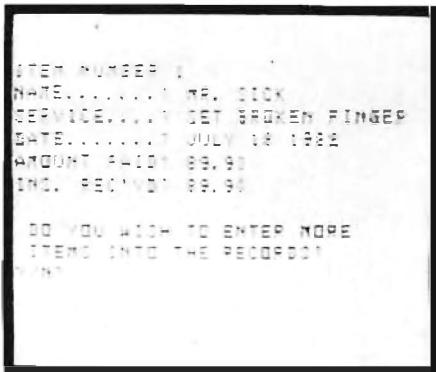


Photo 2a. Medical Records — Data Entry Screen

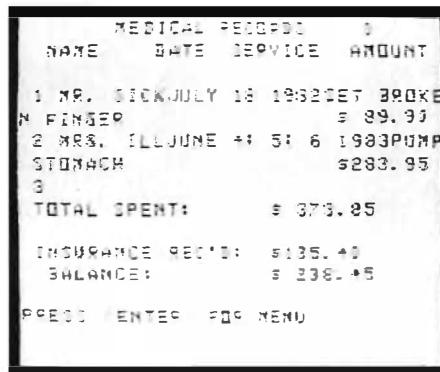


Photo 2b. Medical Records Screen

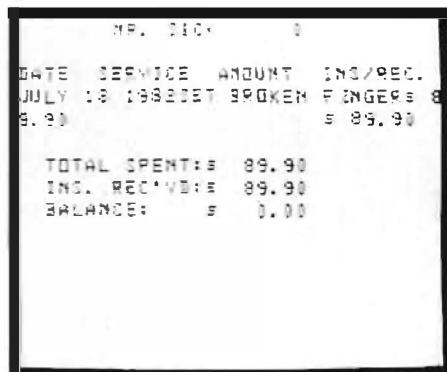


Photo 2c. Expenses for an Individual

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Program Listing. Medical Records

```

10 'MEDICAL RECORDS
20 'JOHN A. DULING
30 GOTO1670
40 CLEAR 2000
50 DIM I(150),N$(150),S$(150),D$(150),A(150),IN(150)
60 W$="$##.##"
70 X$="$###.##"
80 CLS
90 PRINT
100 PRINT TAB(7);"MEDICAL RECORD

110 PRINT
120 PRINT" 1) BEGIN A MEDICAL RECORD
130 PRINT" 2) ADD TO AN EXISTING FILE"
140 PRINT" 3) LIST ALL MEDICAL RECORDS
150 PRINT" 4) SAVE RECORDS ON TAPE"
160 PRINT" 5) LOAD RECORDS FROM TAPE"
170 PRINT" 6) MAKE CHANGES IN RECORDS"
180 PRINT" 7) LIST BY NAME OF PERSON"
190 PRINT" 8) RECORD ON PRINTER"

200 PRINT
210 INPUT " SELECT";K
220 ON K GOTO 250,430,500,790,890,1010,1360,1620
230 PRINT" THE NUMBER YOU HAVE SELECTED IS NOT IN THIS PROGRAM... TRY AGAIN!"
240 FOR X=1TO1500:NEXT:CLS:PRINT:GOTO 80
250 INPUT " ENTER YEAR...";Y
260 CLS
270 I=I+1
280 PRINT
290 PRINT " ITEM NUMBER";(I)
300 INPUT " NAME.....";N$(I)
310 INPUT " SERVICE....";S$(I)
320 INPUT " DATE.....";D$(I)
330 INPUT " AMOUNT PAID";A(I)
340 INPUT " INS. REC'VD";IN(I)
350 PRINT:F=0:G=0
360 IF I>149 THEN 420
370 PRINT" DO YOU WISH TO ENTER MORE ITEMS INTO THE RECORD S?"
```

```

380 INPUT "Y/N"; U$
390 IF U$="N"THEN 450
400 CLS
410 PRINT:GOTO 260
420 PRINT" THAT IS";I;"ITEMS, AL
L YOU CAN ENTER WITH THIS PROGR
AM AS IT IS...""
430 CLS
440 PRINT: GOTO 270
450 PRINT
460 PRINT:PRINT
470 PRINT "PRESS ENTER";
480 INPUT X

490 Z=I:GOTO 80
500 CLS
510 F=0:G=0
520 I=1
530 PRINTTAB(7);"MEDICAL RECORDS
";Y
540 PRINT" NAME DATE SERVIC
E AMOUNT"
550 PRINT
560 PRINTI;TAB(3)N$(I);TAB(10)D$(
I);TAB(16)S$(I);TAB(24);
570 F=F+A(I)
580 G=G+IN(I)
590 IF A(I)=0THEN I=I-1:GOTO640
600 PRINT USING W$;A(I)
610 I=I+1

620 IF INT(I/9)=I/9 THEN PRINT@4
50,"PRESS ANY KEY TO CONTINUE":G
OTO 720
630 GOTO 560
640 PRINT:PRINT " TOTAL SPENT:
";
650 PRINTUSING X$;F
660 PRINT
670 PRINT" INSURANCE REC'D: ";
680 PRINTUSING W$;G
690 PRINT " BALANCE: ";
700 PRINT USING X$;F-G
710 GOTO 760
720 A$=INKEY$
730 IF A$=""THEN 720
740 CLS
750 GOTO 530
760 PRINT:PRINT"PRESS <ENTER> FO
R MENU"
770 A$=INKEY$:IF A$=""THEN 770
780 Z=I:GOTO 80
790 CLS:Z=I

```

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<	>	AND	OR	NOT

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PSET	PUT	READ
RESTORE	RETURN	SCREEN

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IF-THEN-ELSE
ON n GOTO or GOSUB
PMODE
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REM
SOUND

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foxy graf

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```

800 PRINT:PRINT:INPUT" PLACE REC
ORDER IN 'RECORD' MODE AND PRESS
<ENTER>...";R$
810 OPEN "O",#-1,"W"
820 PRINT:PRINT:PRINT" DATA BEIN
G TRANSFERRED"
830 PRINT#-1,Y,Z
840 FOR I = 1 TO Z
850 PRINT#-1,N$(I),S$(I),D$(I),A
(I),IN(I):NEXT I
860 PRINT#-1,F,G
870 CLOSE#-1
880 GOTO 760

890 CLS
900 PRINT:PRINT:PRINT
910 INPUT" PLACE RECORDER IN <P
LAY> AND PRESS <ENTER>";A$
920 PRINT:PRINT" SEARCHING FOR
RECORDS..."
930 OPEN "I",#-1,"W"
940 PRINT" RECORDS LOCATED"
950 INPUT#-1,Y,Z
960 FOR I=1TO Z
970 INPUT#-1,N$(I),S$(I),D$(I),A
(I),IN(I): NEXT I
980 INPUT#-1,F,G
990 CLOSE#-1
1000 I=I-1:GOTO 80

1010 CLS
1020 PRINT
1030 PRINT" ENTER NUMBER OF ITEM
";
1040 INPUT N
1050 PRINT:PRINT" WHICH ENTRY DO
YOU WANT CHANGED?"
1060 PRINT
1070 PRINT" 1) NAME",N$(N)
1080 PRINT" 2) SERVICE",S$(N)
1090 PRINT" 3) DATE",D$(N)
1100 PRINT" 4) AMOUNT",A(N)
1110 PRINT" 5) INS.REC'D",IN(N)

1120 INPUT E
1130 ON E GOTO 1140,1180,1220,12
60,1300
1140 PRINT"NAME: "N$(N)
1150 PRINT"CHANGE TO";
1160 INPUT N$(N)
1170 GOTO 1330
1180 PRINT"SERVICE: "S$(N)
1190 PRINT "CHANGE TO";
1200 INPUT S$(N)

```

```

1210 GOTO 1330
1220 PRINT "DATE: "D$(N)
1230 PRINT "CHANGE TO";
1240 INPUT D$(N)
1250 GOTO 1330
1260 PRINT "AMOUNT: "A(N)
1270 PRINT "CHANGE TO";
1280 INPUT A(N)
1290 GOTO 1330
1300 PRINT "INSURANCE REC'VD: "I
N(N)
1310 PRINT "CHANGE TO";
1320 INPUT IN(N)
1330 FOR X=1TO1000:NEXT
1340 F=0:G=0
1350 Z=I:GOTO80
1360 CLS
1370 H=0:J=0
1380 PRINT "NAME: ";
1390 INPUT P$
1400 CLS:PRINT#-P,TAB(7)P$;TAB(2
0)Y
1410 PRINT#-P:PRINT#-P,"DATE SE
RVICE AMOUNT INS/REC."
1420 FOR I=1 TO Z
1430 IF N$(I)=P$ THEN 1440 ELSE
1510
1440 PRINT#-P,D$(I);TAB(6)S$(I);
TAB(15);
1450 PRINT#-P, USING W$;A(I);
1460 PRINT#-P, TAB(23);
1470 PRINT#-P, USING W$;IN(I)
1480 R=R+1:A=A+1:IF INT(R/9)=R/9
THEN PRINT@450,"PRESS ANY KEY T
O CONTINUE":GOTO1640
1490 H=H+A(I)
1500 J=J+IN(I)
1510 NEXT I
1520 PRINT#-P
1530 PRINT#-P," TOTAL SPENT: ";
1540 PRINT#-P, USING X$;H
1550 PRINT#-P," INS. REC'VD: ";
1560 PRINT#-P, USING X$;J
1570 PRINT#-P," BALANCE: ";
1580 PRINT#-P, USING X$;H-J
1590 A$ = INKEY$
1600 IF A$ ==""GOTO 1590
1610 Z=I:GOTO 80
1620 P=2
1630 PRINT#-P:GOTO 1360
1640 A$=INKEY$
1650 IF A$ ==""GOTO 1640
1660 GOTO 1490
1670 PCLEAR 1:GOTO40
    ----

```

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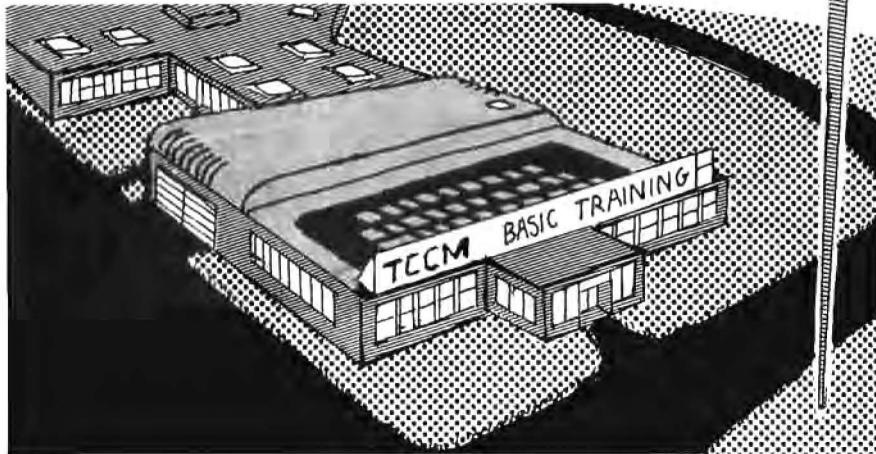
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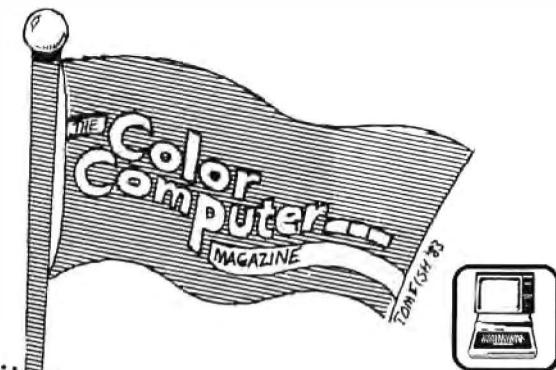
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Non-Extended Editor

Not all good things come from Extended Basic.



by Ronny Ong



sense, because it fools the computer into thinking a string was typed from the keyboard.)

The Program Listing is the result of my toils. I load it before starting any programming session and it is saved with my programs. When I'm through developing a program, I just delete the editor lines. It can always be appended to a Basic program that doesn't have line numbers above 59999. ECB owners can use this editor on any program that uses only Color Basic statements and functions (an FC error would result, otherwise).

Why would ECB owners want to use this editor when they have a built-in Edit command? My editor (Color Basic Editor for lack of a better name) more closely resembles a screen editor than ECB's line editor. That means you can edit the line numbers (resulting in a new line — the line with the original line number will be unchanged), insert and see the break in the line, delete and watch the deleted character disappear.

There is a disadvantage to Color Basic Editor. It's slow to initialize and slow to finish up. If the program it's tacked onto is long, the editor will be even slower, possibly missing a few key presses, if you are a fast typist. The now famous "vitamin E" POKE will help for Color Computers that will allow it (POKE65495,0 for super speed; POKE65494,0 for normal operation of cassette, modem, and printer).

Color Basic Editor is numbered starting at 60000. Few people use numbers that high in their normal programs. On the other hand, many memory-resident utilities written in Basic are numbered a bit higher, to be sure of staying out of the

STANDARD COLOR BASIC is an admirable language. ECB (Extended Color Basic) is yet more admirable. ECB is also an \$80 option. Many newcomers to computers chose a non-Extended Color Computer because they believed they wouldn't need the extra power, and then found it agonizing to use.

The hacker in me chose the standard machine to save the eighty bucks, thinking that I could easily program around any deficiencies in Color Basic. Eventually I had put together a library of program modules with which I could convert almost any ECB program to run in Color Basic. (The program wouldn't work as fast or as efficiently as it would in Extended, but it worked.) I soon realized I hadn't taken into account the one ECB

feature that wasn't involved in the execution of a program, but did make the programming a lot easier: Edit.

I pack my lines tightly, and curse softly whenever program logic forces me to leave a line significantly shorter than 200 characters in length. Tight packing is great for speed and memory conservation, but it wreaks havoc on my fingers when a whole line has to be retyped to change a careless PRIMT. I almost became convinced that saving \$80 wasn't worth it. Then I discovered how to implement a *dynamic keyboard routine* on the Color Computer. I forgot my original purpose when I realized I had just found the key to adding an Edit-like facility to Color Basic! (For readers unfamiliar with the dynamic keyboard concept, it can let programs write other programs, in a



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way. I've left considerable room between my program and the maximum line number, 64999, in case you have utilities you'd like to have handy along with Color Basic Editor. The editor is about 1.4K long and needs about 1.5K of free memory space to run.

How To Use The Editor

To invoke the editor once it is in memory, you can run it by typing RUN60000 (or GOTO60000 or GOSUB60000). When prompted, enter the line number of the line to be edited. The line is displayed (as I've indicated, all this happens after some delay, not long enough to be aggravating, though), a tone sounds, and a flashing cursor appears. Unfortunately, the cursor is not transparent, as a good screen editor cursor should be. As a result, it hides the character underneath.

Of course, it's a simple matter to move the cursor.

Pressing the Right or Left Arrow key moves the cursor one position to the right or left. The Down Arrow key moves the cursor directly to the end of the line. Shifted Right Arrow positions the cursor at the start of the line, over the line number.

Pressing the Clear key produces a beep, and the cursor freezes. At this point, press D to delete the character under the cursor, I to insert a space under the cursor, or H (hack) to delete from the cursor to the end of the line. Pressing any other key aborts this mode. Note that if you use the shift and O keys to go to upper-and lowercase mode, accessing the Clear mode puts the keyboard back into uppercase.

The Enter key ends the edit mode (with a brief pause before the OK prompt, as

mentioned before). Break can be used to abort the edit. No changes will have been made to the line in memory. If you accidentally hit Break, press Clear, enter CONT, and press one of the cursor movement keys.

The rest of the keys, including Up Arrow, Shift-Up, Shift-Down, Shift-Left, and Shift-Clear, produce their usual characters. Any such character replaces the character under the cursor and advances the cursor. This is called *typeover*, and is comparable to ECB Edit's change mode, except that Color Basic Editor is always in this mode when not in Clear mode.

I've probably overemphasized the slowness of Color Basic Editor. It is somewhat slow and it does take up almost 3K of memory, but for the ability to edit my packed lines with quite a bit of flexibility, I don't mind at all. ■ ■ ■

Program Listing. Color Basic Editor

```

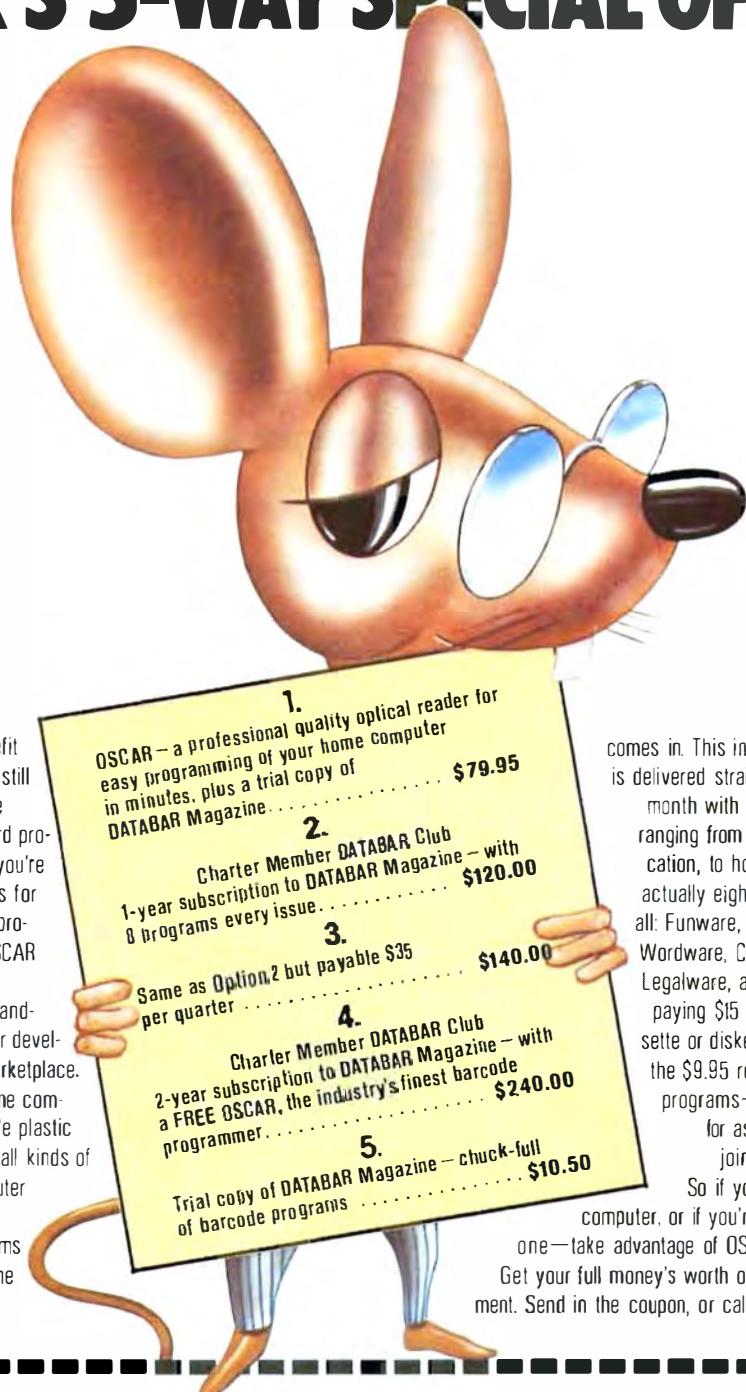
60000 CLS:CLEAR900:DIMI,A$,J,K,T
(52),F(19):T(0)=43622:I=1:PRINT"
COLOR BASIC EDITOR 1.0":PRINT"BY
RONNY ONG":PRINT:FORJ=43624TO43
800:IFPEEK(J)>127THEN(I)=J+1:I=
I+1
60010 NEXT:F(0)=43802:I=1:FORJ=4
3804TO43875:IFPEEK(J)>127THENF(I)
)=J+1:I=I+1
60020 NEXT:SOUND1,1:INPUT"LINE N
UMBER":X:IFX<0ORX>63999ORX<>INT(
X)THEN60140:ELSEI=PEEK(25)*256+P
EEK(26)
60030 J=PEEK(I)*256+PEEK(I+1):IF
J=0THEN60140:ELSEK=PEEK(I+2)*256
+PEEK(I+3):IFK=X THENA$=STR$(X):
A$=RIGHT$(A$,LEN(A$)-1)+" ":I=I+
3:ELSEI=J:GOTO60030

60040 I=I+1:J=PEEK(I):IFJ=0THEN6
0060ELSEIFJ<128THENA$=A$+CHR$(J)
:GOTO60040ELSEIFJ=255THENI=I+1:J
=F(PEEK(I)-128)ELSEJ=T(J-128):IF
J=43630ORJ=43631THENA$=LEFT$(A$,
LEN(A$)-1)
60050 K=PEEK(J):IFK>127THENA$=A$
+CHR$(K-128):GOTO60040ELSEA$=A$+
CHR$(K):J=J+1:GOTO60050
60060 FORI=1TO9:PRINT:NEXT:K=PEE
K(136)*256+PEEK(137)-1280:J=LEN(
STR$(X)):B$=INKEY$:SOUND60,2
60065 PRINT@K,A$:PRINT:PRINT@K+J
," ";
60070 EXEC41369:B$=INKEY$:IFB$="
```

```

"THEN60070ELSEI=ASC(B$):IFI>31TH
ENPRINTB$::A$=LEFT$(A$,J)+B$+RIG
HT$(A$,LEN(A$)-J-1):J=J+1:IFJ=LE
N(A$)THENJ=J-1:PRINTCHR$(8)::GOT
O60070ELSE60070ELSEIFI=8THENJ=J+
(J>0):GOTO60065ELSEIFI=9THENJ=J-
(J<LEN(A$)-1):GOTO60065
60080 IFI=10THENJ=LEN(A$)-1:GOTO
60065ELSEIFI=21THENJ=0:GOTO60065
ELSEIFI=13THEN60150ELSEPOKE282,2
55:SOUND180,2
60090 B$=INKEY$:IFB$=""THEN60090
ELSEIFB$="D"ANDLEN(A$)>1THENA$=L
EFT$(A$,J)+RIGHT$(A$,LEN(A$)-J-1)
ELSEIFB$="I"ANDLEN(A$)<249THENA
$=LEFT$(A$,J)+" "+RIGHT$(A$,LEN(
A$)-J)ELSEIFB$="H"ANDJ THENA$=LE
FT$(A$,J)
60100 J=J+(J=LEN(A$)):GOTO60065
60140 PRINT"NO SUCH LINE":CLEAR2
00:END
60150 FORI=1TOLEN(A$):POKEI+732,
ASC(MID$(A$,I,1)):NEXT:CLS:FORI=
0TO25:K=0:FORJ=1TO2:X=ASC(MID$(
35108E00CC3440CE0182C603BDA59AC6
008E02DC5C35407EA3CC",I*2+J,1))::
K=K*16+(X-48+7*(X>57)):NEXT:POKE
178+I,K:NEXT:FORI=204TO206:POKEI
,PEEK(I+182):NEXT
60160 POKE194,LEN(A$):I=733+LEN(
A$):POKE196,I/256:POKE197,I-PEEK
(196)*256:CLEAR200:POKE386,57:PO
KE387,0:POKE388,178:POKE386,126:
END
```

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Dissecting Your ROM

The sixth of 14 articles.

by Jake Commander

INCLUDED IN THIS month's disassembly are some string handling routines such as CHR\$, MID\$, ASC and a few other familiar string-related functions. Token encoding and decoding is also covered, and we end up at the Print command.

Included with the string commands is the notorious string garbage-collector routine. By following this code, it's possible to see why it can hang up the computer for lengthy time periods without allowing recourse to the Break key. Roughly, it works like this. Imagine you have a statement LET A\$ = "CHAR"+"AC-TERS". The Basic interpreter has to save this

string somewhere, and it does so in the string space allotted by you in the Clear statement. Say you've used up all your string space at the exact moment you wish to have "CHARTERS" saved as a variable. The result is likely to be an ?OS ERROR, but Basic doesn't do this to you without first attempting a valiant struggle on your behalf. This struggle is the garbage-collection routine. It's painful, but necessary.

The purpose of this routine is to close up all the gaps in string memory caused



by de-allocation of old strings. Every time you wish to assign a new string in string memory and you've hit the bottom of your string space, Basic will check every string variable to see if its characters are still taking up room in that string space. Starting at the highest string it can find, it works its way downwards, copying the lower strings upwards over any now unused string characters. If this results in string space being made available for "CHARTERS" your skin is saved. Otherwise, you're landed with the ?OS ERROR

message and you'll have to Clear more room.

Once Basic has entered the garbage-collection mode, it won't stop until it's cleaned up the string space by checking every active string variable. If you have lots of variables, a lot of string space, and many holes to be filled, this can take many minutes. And as no polling of the Break key takes place, you just have to sit and wait.

Also included in the Listing is the portion of ROM which deals with encoding and decoding Basic tokens. *Encoding* is performed every time you enter a line of one or more Basic statements. *Decoding* is done whenever you need a line listed in readable

form. This can be during a List, LLIST, or even a Save procedure with the ASCII option.

Finally, the most-used of any Basic command — PRINT. Code for this starts at \$BF87 and runs to \$B9B1. All these short routines really accomplish is to deal with print formatting, specified with such statements as TAB or PRINT @. PRINT USING is not implemented in regular Basic so we don't get to see this until the second half of the series during the Extended Basic routines.

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Program Listing. Disassembly

Line Number	Address	Object Code	Mnemonic	Operand	Jake's Comment	Line Number	Address	Object Code	Mnemonic	Operand	Jake's Comment
02626	B4CE 86 10		LDA	#\$10	;Tally for number of shifts	02666	B51E 30 01		LEAX	1,X	;Next character
02627	B4D0 97 45		STA	<\$45		02667	B520 9F 62		STX	<\$62	;Save string start
02628	B4D2 EC 05		LDD	5,X	;Nr of elements this dimension	02668	B522 9F 58		STX	<\$58	
02629	B4D4 DD 17		STD	<\$17	;Save it	02669	B524 C6 FF		LDB	#\$FF	;Initialize char count = -1
02630	B4D6 4F		CLRA		;Initialize ...	02670	B526 5C		INC B		;Bump character count
02631	B4D7 5F		CLRB		;... D register	02671	B527 A6 80		LDA	,X+	;Get string character
02632	B4D8 58		ASLB		;Shift left...	02672	B529 27 0C		BEQ	\$B537	;If end of string
02633	B4D9 49		ROLA		;... D register	02673	B52B 91 01		CMPA	<1	;Delimiter?
02634	B4DA 25 0F		BLO	\$B4EB	;?BS Error if overflow	02674	B52D 27 04		BEQ	\$B533	;Yes
02635	B4DC 08 65		ASL	<\$65	;Number of bytes per element	02675	B52F 91 02		CMPA	<2	;Delimiter?
02636	B4DE 09 64		ROL	<\$64	;High bit = 1?	02676	B531 26 F3		BNE	\$B526	;No
02637	B4E0 24 04		BRS	\$B4E6	;If no add-in needed	02677	B533 81 22		CMPA	#\$22	;Delimiter = quote?
02638	B4E2 D3 17		ADDD	<\$17	;Else add-in multiplier	02678	B535 27 02		BEQ	\$B539	;Yes
02639	B4E4 25 05		BLO	\$B4EB	;?BS Error if overflow	02679	B537 30 1F		LEAX	-1,X	;Else backoff the pointer
02640	B4E6 0A 45		DEC	<\$45	;Decrement tally	02680	B539 9F 64		STX	<\$64	;Save string end
02641	B4E8 26 EE		BNE	\$B4D8	;Continue until tally=0	02681	B53B D7 56		STB	<\$56	;Save number of characters
02642	B4EA 39		RTS			02682	B53D DE 62		LDU	<\$62	;String start
02643	B4EB 7E B447		JMP	\$B447	;?BS Error	02683	B53F 118303D9		CMPU	#\$03D9	;String in scratch area?
MEM						02684	B543 22 07		BHI	\$B54C	;No
02644	B4EE 1F 40		TFR	S,D	;Stack pointer to D	02685	B545 8D C6		BSR	\$B50D	;Get next memory string space
02645	B4F0 93 1F		SUBD	<\$1F	;Minus next array pointer	02686	B547 9E 62		LDX	<\$62	;=> string source
02646	B4F2 21 4F		BRN	\$B543	;Mask opcode for next instr	02687	B549 BD B645		JSR	\$B645	;Copy string to memory
----	B4F3 4F		CLRA		; (MSB D=0)	02688	B54C 9E 0B		LDX	<\$0B	;Next string stack pointer
02647	B4F4 0F 06		CLR	<6	;Set numeric variable type	02689	B54E 8C 01D1		CMPX	#\$01D1	;Stack full?
Return 2 bytes from D						02690	B551 26 05		BNE	\$B558	;No
02648	B4F6 DD 50		STD	<\$50	;Store integer in FPAC1	02691	B553 C6 1E		LDB	#\$1E	;?ST Error code
02649	B4F8 C6 90		LDB	#\$90	;Exponent = 16	02692	B555 7E AC46		JMP	\$AC46	;Error processing
02650	B4FA 7E BC82		JMP	\$BC82	;To floating point	02693	B558 96 56		LDA	<\$56	;Number of characters
STR\$()						02694	B55A A7 00		STA	0,X	;To string stack
02651	B4FD BD B143		JSR	\$B143	;Compute numeric variable	02695	B55C DC 58		LDD	<\$58	;suffix w/ string start pointer
02652	B500 CE 03D9		LDU	#\$03D9	;=> String buffer	02696	B55E ED 02		STD	2,X	
02653	B503 BD BDCC		JSR	\$BDCC	;Convert integer to ASCII	02697	B560 86 FF		LDA	<\$FF	;Variable type = string
02654	B506 32 62		LEAS	2,S	;Pop return	02698	B562 97 06		STA	<6	;Flag it
02655	B508 8E 03D8		LDX	#\$03D8	;=> buffer minus one	02699	B564 9F 0D		STX	<\$0D	;Current string var pointer
02656	B50B 20 0B		BRA	\$B518	;String info to string stack	02700	B566 9F 52		STX	<\$52	;Current string stack pointer
Get next memory string pointer						02701	B568 30 05		LEAX	5,X	;Bump to next...
02657	B50D 9F 4D		STX	<\$4D	;Save current string pointer	02702	B56A 9F 0B		STX	<\$0B	;...string stack position
02658	B50F 8D 5C		BSR	\$B56D	;Get nxt memry strng space to X	02703	B56C 39		RTS		
02659	B511 9F 58		STX	<\$58	;String pointer	Get next memory string space (B=LEN)					
02660	B513 D7 56		STB	<\$56	;Number of characters in string	02704	B56D 0F 07		CLR	<7	
02661	B515 39		RTS			02705	B56F 4F		CLRA		;Signal "not garbaged" yet
String information to string stack						02706	B570 34 06		PSHS	A,B	;D = nbr of chars in string
02662	B516 30 1F		LEAX	-1,X		02707	B572 DC 23		LDD	<\$23	;To stack
02663	B518 86 22		LDA	#\$22	;Delimiter = quote	02708	B574 A3 E0		SUBD	,S+	;Next available mem strng space
02664	B51A 97 01		STA	<1	;Allowed delimiters	02709	B576 109321		CMPD	<\$21	= nxn avbl spc afttr this strg
02665	B51C 97 02		STA	<2		02710	B579 25 0A		BLO	\$B585	;Does it go below the stack?
						02711	B57D BB 23		STD	<\$23	;Yes, try garbage collection
						02712	B57D 9E 23		LDX	<\$23	;Else this is new next strg spc
						02713	B57F 30 01		LEAX	1,X	;+1 adjust for curnt strg start

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Line Number	Address	Object Code	Mnemonic	Operand	Jake's Comment	Line Number	Address	Object Code	Mnemonic	Operand	Jake's Comment						
02714	B581 9F 25		STX	<\$25	;Start of last string in memory	02763	B5E1 22 09		BHI	\$B5EC	;No, try next string						
02715	B583 35 84		PULS	B,PC		02764	B5E3 109347		CMPD	<\$47	;Above current highest string?						
02716	B585 C6 1A		LDB	#\$1A	;Possible ?OS Error	02765	B5E6 23 04		BLS	\$B5EC	;No, try next string						
02717	B587 03 07		COM	<7	;Garbage collection been done?	02766	B5E8 9F 4B		STX	<\$4B	;String varptr of highest so far						
02718	B589 27 CA		BEQ	\$B555	;Yes, bad luck	02767	B5EA DD 47		STD	<\$47	;String pointer of highest						
02719	B58B 8D 04		BSR	\$B591	;Do garbage collection	02768	B5EC 30 05		LEAX	5,X	;Bump to next varptr						
02720	B58D 35 04		PULS	B	;Restore # bytes required	02769	B5EE 39		RTS								
02721	B58F 20 DE		BRA	\$B56F	;Try again for string space	02770	B5EF 9E 4B		LDX	<\$4B	;Any string found to move?						
<i>Garbage collection</i>																	
02722	B591 9E 27		LDX	<\$27	;Maximum memory	02771	B5F1 27 FB		BEQ	\$B5EE	;RTS if not						
02723	B593 9F 23		STX	<\$23	;Current highest strng to check	02772	B5F3 4F		CLRA		;MSB=0						
02724	B595 4F		CLRA		;Set D=0	02773	B5F4 E6 84		LDB	,X	;Highest string length						
02725	B596 5F		CLRB			02774	B5F6 5A		DEC B		;Offset length to 0						
02726	B597 DD 4B		STD	<\$4B	;Flag no string moved	02775	B5F7 D3 47		ADDD	<\$47	;=> string end						
02727	B599 9E 21		LDX	<\$21	;Stack top	02776	B5F9 DD 43		STD	<\$43	= source of string to move						
02728	B59B 9F 47		STX	<\$47	;Current highest string found	02777	B5FB 9E 23		LDX	<\$23	=> current highest checkpoint						
02729	B59D 8E 01A9		LDX	\$01A9	;String stack start	02778	B5FD 9F 41		STX	<\$41	= destination of string to move						
02730	B5A0 9C 0B		CMPX	<\$0B	;=next string stack pointer?	02779	B5FF BD AC20		JSR	\$AC20							
02731	B5A2 27 04		BEQ	\$B5A8	;If string stack empty	02780	B602 9E 4B		LDX	<\$4B	;Copy string						
02732	B5A4 8D 32		BSR	\$B5D8	;Check if string higher up	02781	B604 DC 45		LDD	<\$45	;Old string varptr						
02733	B5A6 20 F8		BRA	\$B5A0	;Do next on string stack	02782	B606 ED 02		STD	2,X	;New string start...						
02734	B5A8 9E 1B		LDX	<\$1B	;Next BASIC pointer	02783	B608 9E 45		LDX	<\$45	;Replaces previous string ptr						
02735	B5AA 9C 1D		CMPX	<\$1D	;=next variable pointer?	02784	B60A 30 1F		LEAX	-1,X	;New string start						
02736	B5AC 27 04		BEQ	\$B5B2	;Variables all done	02785	B60C 7E B593		JMP	\$B593	;l down = new high checkpoint						
02737	B5AE 8D 22		BSR	\$B5D2	;Check if string higher	<i>String concatenate</i>											
02738	B5B0 20 F8		BRA	\$B5AA	;Do next variable	02786	B60F DC 52		LDD	<\$52	;Currnt (1st) string stack ptr						
02739	B5B2 9F 41		STX	<\$41	;Save next avlbl var pointer	02787	B611 34 06		PSHS	A,B	;Hold it						
02740	B5B4 9E 41		LDX	<\$41	;Current array pointer	02788	B613 BD B223		JSR	\$B223	;Check 2nd operand						
02741	B5B6 9C 1F		CMPX	<\$1F	;=next available array pointer?	02789	B616 BD B146		JSR	\$B146	;Do ?TM Error if not string						
02742	B5B8 27 35		BEQ	\$B5EF	;Yes, move required string	02790	B619 35 10		PULS	X	;1st string stack pointer						
02743	B5BA EC 02		LDD	2,X	;Array size	02791	B61B 9F 62		STX	<\$62	;Save strg info ptr 1st string						
02744	B5BC D3 41		ADD D	<\$41	;New next array pointer	02792	B61D E6 84		LDB	,X	# characters in 1st string						
02745	B5BD DD 41		STD	<\$41		02793	B61F 9E 52		LDX	<\$52	;Current (2nd) strg stack ptr						
02746	B5C0 A6 01		LDA	1,X	;Array var name character #2	02794	B621 EB 84		ADDB	,X	;Add # characters in 2nd string						
02747	B5C2 2A F0		BPL	\$B5B4	;If not string array	02795	B623 24 05		BHS	\$B62A	;Length OK if no carry						
02748	B5C4 E6 04		LDB	4,X	;Number of dimensions	02796	B625 C6 1C		LDB	#\$1C	?LS Error code						
02749	B5C6 58		ASLB		;Times two	02797	B627 7E AC46		JMP	\$AC46	Error processing						
02750	B5C7 CB 05		ADDB	#5	;Offset past array information	02798	B62A BD B50D		JSR	\$B50D	Get next memory string pointer						
02751	B5C9 3A		ABX		;Point to array string pointer	02799	B62D 9E 62		LDX	<\$62	1st string info pointer						
02752	B5CA 9C 41		CMPX	<\$41	;End of array?	02800	B62F E6 84		LDB	,X	# characters 1st string						
02753	B5CC 27 E8		BEQ	\$B5B6	;Yes, see if more	02801	B631 8D 10		BSR	\$B643	;Copy string to memory						
02754	B5CE 8D 08		BSR	\$B5D8	;Check if string higher	02802	B633 9E 4D		LDX	<\$4D	Current (2nd) string info ptr						
02755	B5D0 20 F8		BRA	\$B5CA	;Do next array	02803	B635 8D 22		BSR	\$B659	Get str ptr to X, # chars to B						
02756	B5D2 A6 01		LDA	1,X	;Second character of var name	02804	B637 8D 0C		BSR	\$B645	Append string to memory						
02757	B5D4 30 02		LEAX	2,X	;Bump to string varptr	02805	B639 9E 62		LDX	<\$62	Restore string start						
02758	B5D6 2A 14		BPL	\$B5EC	;If not string variable	02806	B63B 8D 1C		BSR	\$B659	Get str ptr to X, # chars to B						
02759	B5D8 E6 84		LDB	,X	;String length	02807	B63D BD B54C		JSR	\$B54C	String info to string stack						
02760	B5DA 27 10		BEQ	\$B5EC	;If null string	02808	B640 7E B168		JMP	\$B168	Cont expression computation						
02761	B5DC EC 02		LDD	2,X	;String pointer	<i>Copy string to memory</i>											
02762	B5DE 109323		CMPD	<\$23	;String below highest chkpoint?	02809	B643 AE 02		LDX	2,X	=> string source						



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Arcade Action. Method of play you are the Grabber. The object is to grab the 8 treasures and store them in the center boxes. You start with 3 Grabbers and get extra ones at 20,000 points. Watch out for the googlies! Super high resolution graphics.

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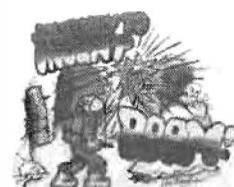
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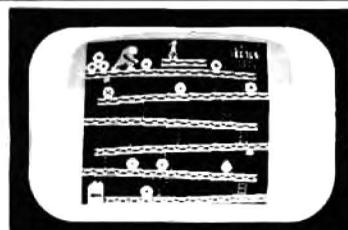
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By KEN KALISH
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THE KING

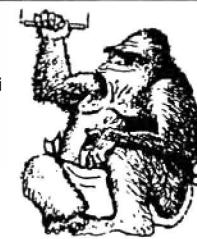
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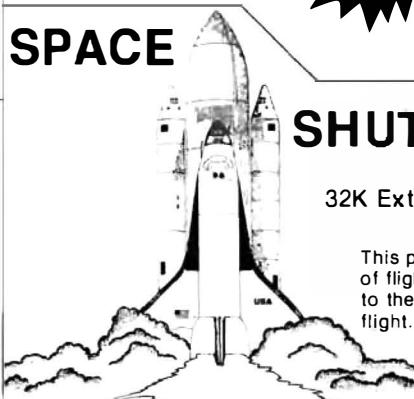
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Line Number	Object Address	Code	Mnemonic	Operand	Jake's Comment	Line Number	Object Address	Code	Mnemonic	Operand	Jake's Comment					
02810	B645	DE 25	LDU	<\$25	;=> Next avlb mem string space	02854	B699	A7 84	STA	,X	;Store CHR\$ value					
02811	B647	5C	INC B		;Adjust # of chars for loop	02855	B69B	32 62	LEAS	2,S	;Remove return					
02812	B648	20 04	BRA	\$B64E		02856	B69D	7E B54C	JMP	\$B54C	;Update string stack					
02813	B64A	A6 80	LDA	,X+	;Character from source	ASC(x)										
02814	B64C	A7 C0	STA	,U+	;To destination	02857	B6A0	8D 02	BSR	\$B6A4	;Get leftmost character					
02815	B64E	5A	DEC B		;More to do?	02858	B6A2	20 DF	BRA	\$B683	;Return character as integer					
02816	B64F	26 F9	BNE	\$B64A	;Continue if so	LEFT\$(x\$,x)										
02817	B651	DF 25	STU	<\$25	;= Next memory string space	02859	B6A4	8D E0	BSR	\$B686	;Get length of string					
02818	B653	39	RTS			02860	B6A6	27 5E	BEQ	\$B706	?FC Error if null string					
Get string pointer to X & number of characters to B																
02819	B654	BD B146	JSR	\$B146	;Compute variable expression	02861	B6A8	E6 84	LDB	,X	;Leftmost character					
02820	B657	9E 52	LDX	<\$52	;Current string stack pointer	02862	B6AA	39	RTS							
02821	B659	E6 84	LDB	,X	;Number of characters in string	02863	B6AB	8D 48	BSR	\$B6F5	;Get string params from stack					
02822	B65B	8D 18	BSR	\$B675	;Check if string in strng stack	02864	B6AD	4F	CLRA		;Set string position to start					
02823	B65D	26 13	BNE	\$B672	;If not, use info	02865	B6AE	E1 84	CMPB	,X	?# chars req'd <= strg lngh?					
02824	B65F	AE 07	LDX	7,X	;=> string	02866	B6B0	23 03	BLS	\$B6B5	;New string to memory if so					
02825	B661	30 1F	LEAX	-1,X	; -1	02867	B6B2	E6 84	LDB	,X	;Else use string length...					
02826	B663	9C 23	CMPX	<\$23	;String @ bottom of strng space?	02868	B6B4	4F	CLRA		;...and start position					
02827	B665	26 08	BNE	\$B66F	;No	02869	B6B5	34 06	PSHS	A,B	;Save position and # characters					
02828	B667	34 04	PSHS	B	;Bold # characters in string	02870	B6B7	BD B50F	JSR	\$B50F	;Get next mem string space to X					
02829	B669	D3 23	ADDD	<\$23	;=> last character in string	02871	B6B8	9E 4D	LDX	<\$4D	;String varptr					
02830	B66B	DD 23	STD	<\$23	;Make space available for use	02872	B6BC	8D 9B	BSR	\$B659	;String ptr to X, # chars to B					
02831	B66D	35 04	PULS	B	;Restore # characters in string	02873	B6BE	35 04	PULS	B	;Number of chars from start					
02832	B66F	30 01	LEAX	1,X	;Restore pointer to strng start	02874	B6C0	3A 00	ABX		;Point to string position					
02833	B671	39	RTS			02875	B6C1	35 04	PULS	B	;Number of characters required					
02834	B672	AE 02	LDX	2,X	;String pointer to X	02876	B6C3	BD B645	JSR	\$B645	;Copy string to memory					
02835	B674	39	RTS			02877	B6C6	20 D5	BRA	\$B69D	;Update string stack					
RIGHT\$(x\$,x)																
02836	B675	9C 0D	CMPX	<\$0D	;Current string in strng stack?	02878	B6C8	8D 2B	BSR	\$B6F5	;Get strng parameters off stack					
02837	B677	26 07	BNE	\$B680	;RTS if not	02879	B6CA	A0 84	SUBA	,X	?# chars required minus length					
02838	B679	9F 0B	STX	<\$0B	;Save next string stack pointer	02880	B6CC	40	NEGA		;Get start character position					
02839	B67B	30 1B	LEAX	-5,X	;Backoff to prev strng in stack	02881	B6CD	20 DF	BRA	\$B6AE	;New string to memory					
02840	B67D	9F 0D	STX	<\$0D	;Save current string pointer											
02841	B67F	4F	CLR		;Set ZF, D = B	02882	B6CF	C6 FF	LDB	#\$FF	;Default # characters = 255					
02842	B680	39	RTS			02883	B6D1	D7 53	STB	<\$53	;To FPAC1					
LEN(x\$)																
02843	B681	8D 03	BSR	\$B686	;Get variable length to B	02884	B6D3	9D A5	JSR	<\$A5	;Parse current char					
02844	B683	7E B4F3	JMP	\$B4F3	;Return as integer	02885	B6D5	81 29	CMPA	\$#29	";")?					
02845	B686	8D CC	BSR	\$B654	;Compute variable	02886	B6D7	27 05	BEQ	\$B6DE	;If end parameters					
02846	B688	0F 06	CLR	<6	;Set numeric variable type	02887	B6D9	BD B26D	JSR	\$B26D	;Syntax check for ", "					
02847	B68A	5D	TSTB		;Length in B	02888	B6DC	8D 2D	BSR	\$B70B	;Compute number < 256 to FPAC1					
02848	B68B	39	RTS			02889	B6DE	8D 15	BSR	\$B6F5	;String parameters from stack					
CHR\$(x)																
02849	B68C	BD B70E	JSR	\$B70E	;Get number < 256 to <\$53	02890	B6E0	27 24	BEQ	\$B706	?FC Error if position = 0					
02850	B68F	C6 01	LDB	#1	;Set string length = 1	02891	B6E2	5F	CLRB		;Allow 0 chars if pstrn >= length					
02851	B691	BD B56D	JSR	\$B56D	;Get next memory string space	02892	B6E3	4A	DECA		;Offset position to 0					
02852	B694	96 53	LDA	<\$53	;CHR\$ number	02893	B6E4	A1 84	CMPA	,X	;Start pstrn required > length?					
02853	B696	BD B511	JSR	\$B511	;Strg pntr: <\$58, # chars: <\$56	02894	B6E6	24 CD	BHS	\$B6B5	;Null string to memory if so					
						02895	B6E8	1F 89	TFR	A,B	;Character position...					
						02896	B6EA	E0 84	SUBB	,X	;...minus string length					

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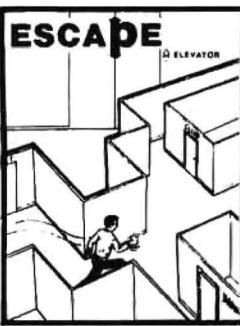
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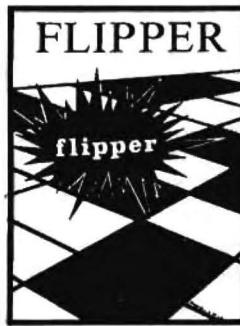
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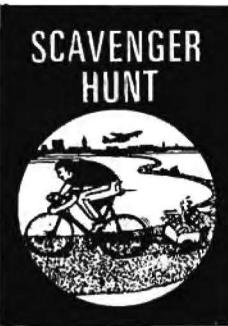
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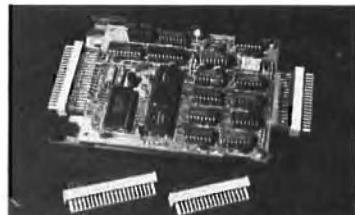
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Line Number	Object Address	Code	Mnemonic	Operand	Jake's Comment	Line Number	Object Address	Code	Mnemonic	Operand	Jake's Comment
02897	B6EC 50	NEGB			;= maximum # chars remaining	02939	B746 81 90	CMPA	#\$90		;Maximum allowed
02898	B6ED D1 53	CMPB	<\$53		;#Chars req'd gtr # remaining?	02940	B748 22 BC	BHI	\$B706		;?FC Error if > 65535
02899	B6EF 23 C4	BLS	\$B6B5		;If so, use # remaining	02941	B74A BD BCC8	JSR	\$BCC8		;FPACl to integer
02900	B6F1 D6 53	LDB	<\$53		;Else use number specified	02942	B74D 9E 52	LDX	<\$52		;Integer to X
02901	B6F3 20 C0	BRA	\$B6B5		;New string to memory	02943	B74F 39	RTS			
Get string parameters off stack											
02902	B6F5 BD B267	JSR	\$B267		;Syntax check for ")"	02944	B750 8D EE	BSR	\$B740		;Get valid PEEK address
02903	B6F8 EE E4	LDU	,S		;Return address to U	02945	B752 E6 84	LDB	,X		;Peek it
02904	B6FA AE 65	LDX	5,S		;String VARPTR to X	02946	B754 7E B4F3	JMP	\$B4F3		;Return single byte
02905	B6FC 9F 4D	STX	<\$4D			02947	B757 8D DB	BSR	\$B734		;Get valid parameters
02906	B6FE A6 64	LDA	4,S		;# characters specified	02948	B759 9E 2B	LDX	<\$2B		;Integer
02907	B700 E6 64	LDB	4,S		;# characters specified	02949	B75B E7 84	STB	,X		;Do poke
02908	B702 32 67	LEAS	7,S		;Adjust stack pointer	02950	B75D 39	RTS			
02909	B704 1F 35	TFR	U,PC		;RTS	02951	B75E C6 FE	LDB	#\$FE		;Printer device number
02910	B706 7E B44A	JMP	\$B44A		;?FC Error	02952	B760 D7 6F	STB	<\$6F		;To DEVNUM
02911	B709 9D 9F	JSR	<\$9F		;Parse next char	02953	B762 9D A5	JSR	<\$A5		;Parse current char
Compute number < 256											
02912	B70B BD B141	JSR	\$B141		;Computer numeric variable	02954	B764 34 01	PSHS	CCR		;Save end of line status
02913	B70E BD B3E9	JSR	\$B3E9		;Get Integer to D	02955	B766 BD AF67	JSR	\$AF67		;ASCII to Integer in \$28
02914	B711 4D	TSTA			;MSB	02956	B769 BD AD01	JSR	\$AD01		;Search for line number
02915	B712 26 F2	BNE	\$B706		;?FC Error if greater than 255	02957	B76C 9F 66	STX	<\$66		;=> List pointer
VAL(x\$)											
02916	B714 0E A5	JMP	<\$A5		;Parse current char	02958	B76E 35 01	PULS	CCR		;End of line status
02917	B716 BD B686	JSR	\$B686		;Get string parameters	02959	B770 27 12	BEQ	\$B784		;If no numbers after LIST
02918	B719 1027 031C	LBEQ	\$BA39		;Return # 0 if null	02960	B772 9D A5	JSR	<\$A5		;Parse current char
02919	B71D DE A6	LDU	<\$A6		;Hold current parse pointer	02961	B774 27 13	BEQ	\$B789		;If one line
02920	B71F 9F A6	STX	<\$A6		;Use string to parse	02962	B776 81 AC	CMPA	#\$AC		;"-?"
02921	B721 3A	ABX			;Offset to string end	02963	B778 26 09	BNE	\$B783		;RTS if not
02922	B722 A6 84	LDA	,X		;Character after string	02964	B77A 9D 9F	JSR	<\$9F		;Parse next char
02923	B724 34 52	PSHS	A,X,U		;Save registers	02965	B77C 27 06	BEQ	\$B784		;If no end line #
02924	B726 6F 84	CLR	,X		;Delimit string	02966	B77E BD AF67	JSR	\$AF67		;ASCII to integer in \$28
02925	B728 9D A5	JSR	<\$A5		;Parse current string pointer	02967	B781 27 06	BEQ	\$B789		;Do LIST if end of line
02926	B72A BD BD12	JSR	\$BD12		;Convert ASCII number	02968	B783 39	RTS			;Else ignore command
02927	B72D 35 52	PULS	A,X,U		;Restore Registers	02969	B784 CE FFFF	LDU	#\$FFFF		;=65536
02928	B72F A7 84	STA	,X		;Restore character after string	02970	B787 DF 2B	STU	<\$2B		;Default end line number
02929	B731 DF A6	STU	<\$A6		;Restore parse pointer	02971	B789 32 62	LEAS	2,S		;Pop return
02930	B733 39	RTS				02972	B78B 9E 66	LDX	<\$66		;=> Current list link pointer
Get number < 65536 to X and FPACl											
02931	B734 8D 07	BSR	\$B73D		;Get number > 0 and < 65536 to X	02973	B78D BD B95C	JSR	\$B95C		;Print C/R if needed
02932	B736 9F 2B	STX	<\$2B		;Hold integer	02974	B790 BD A549	JSR	\$A549		;Chk brk/pause if no castte o/p
02933	B738 BD B26D	JSR	\$B26D		;Check "," delimiter	02975	B793 EC 84	LDD	,X		;Pointer to D
02934	B73B 20 CE	BRA	\$B70B		;Get number < 256 to B	02976	B795 26 08	BNE	\$B79F		;If not end
02935	B73D BD B141	JSR	\$B141		;Compute numeric variable	02977	B797 BD A42D	JSR	\$A42D		;Close file
02936	B740 96 54	LDA	<\$54		;Check sign	02978	B79A 0F 6F	CLR	<\$6F		;Reset Device number
02937	B742 2B C2	BMI	\$B706		;?FC Error if < 0	02979	B79C 7E AC73	JMP	\$AC73		;Goto "OK"
02938	B744 96 4F	LDA	<\$4F		;Exponent	02980	B79F 9F 66	STX	<\$66		;Save link pointer
						02981	B7A1 EC 02	LDD	2,X		;Line number to D
						02982	B7A3 10932B	CMPD	<\$2B		;End line number?

PETROCCI FREELANCE ASSOCIATES

Inspector CLUEseau

Sherlock Holmes/Agatha Christie fans—It's finally here—A murder mystery game for the 80-C! Mr. Goodbody has been killed in his mansion and you must solve the mystery. WHO committed the murder, WHERE did it occur and HOW was it done? Question suspects, find the secret passage, and break the code to get clues. Hi-Res graphics enhances this excellent game. The computer records the clues you obtain on a clue inventory screen and also provides suspect descriptions at the touch of a finger. A fast, fun game that will sharpen your deductive skills. Every game is different!

32K Extended \$19.95

Bowling Secretary

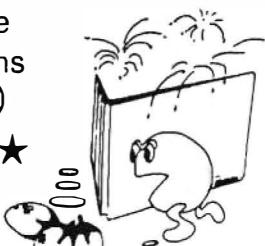
Save hours of tedious work with this efficient program. Calculates individual player average, high game and total pins, as well as team games won/lost, high series, and cumulative total team points. Also calculates team standings for each week in order from 1st to last! All data stores to tape and outputs to printer to provide professional, easy to read copy. After initial input of league and player names all you have to do is input each week's scores - the computer does the rest!!!

16KEXT Cassette \$24.95 32KEXT Disk 29.95

Just Like The Arcade
2 Intermission Screens
(Fireworks & Chase)

★ PATTI-PAK ★

Invisible Maze
Every 4th Screen



★ \$21.95 ★ 16K Machine Language

★ SUPER DISK UTILITY ★

This one does it all! Complete catalog of up to 800 files in matter of minutes. (Machine language sort routine) — Sorts Directory in alphabetical order and writes it back to disk - Dates files - Super Directory prints directory to screen or printer showing # of granules, starting granule, date, start, end, entry address - Purge Files - Complete Disk Zap contains copy, verify, display (allowing modification of), zero and move disk file sectors; allocation table check and repair.

32K EXT DISK \$44.95

Heart-Lung-Circulatory Systems

Hi-Res Graphic Education

A difficult subject becomes easy to learn. Programmed learning approach divides subject content into concise frames of information. Hi-res graphic display with labelled anatomical structures follows text frames for added clarity. Visually highlights keywords and concepts. Self test questions follow each section. Provides immediate feedback to user response and displays correct answers before moving to new subject matter. Excellent for school or home use.

32KEXT Tape \$34.95

32KEXT Disk \$39.95

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New!!

Plots up to three hurricanes simultaneously on hi-res map. Excellent graphic display.

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16KEXT Tape \$15.95
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Calculates Nat'l Weather Service Statistics. Great for Science Projects and Hobbyists. Well formatted printout.

16KEXT Tape \$24.95
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Special Price 32KEXT Disk \$19.95

Resultant Wave Form
Plot resultant waves from up to 8 generated waves. A great way to illustrate this concept. 32K \$15.95

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32KEXT Disk \$29.95

BOND YIELD

Helps you find "best buy" in selecting bonds. You select several bonds for comparison and program calculates yield to maturity for each. You will see surprising variations and use of this program will spot "true bargains" in the bond market. Well Documented. Printer Output Option.

16KEXT Tape \$19.95
32KEXT Disk \$24.95

Include \$1.50 for handling for each program.
Az. Residents add 6% Sales Tax.
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STRESS EVALUATOR

Measures your stress level and illness potential.

Coping Ability Test/Goal Setting Exercises
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Printer output option
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32KEXT Disk \$24.95

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Deliver Annabelle and the Gold to the Judge. But watch for Indians and the James Gang!!
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Accommodates Placidian, Equal House,
Modified Equal
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32KEXT Disk \$26.95

VIPTM

Library

ANNOUNCING The VIP Library™ With a Terrific Sale!

Nelson Software Systems is now Softlaw Corporation, under new management. Our Super "Color" Library programs have also undergone a name change. All programs are the same unbeatable Super "Color" Library programs you've heard so much about, but with new VIP names. To introduce our **VIP Library** we are having a special sale on the following pages. Our low prices for such high quality can't be beat so get started today!

Official Library of Software for the TANO Dragon

(Sold for the TANO Dragon only by TANO Microcomputer Products, Corp. and its distributors)

The Library Concept

State of the Art, Quality, Integrity, Compatibility and Affordability. Five things good software must possess. Five things that epitomize the **VIP Library™**. Each program is the diamond of its class, true excellence. These programs are first in features, first in power, first in memory, and all are affordably priced. And for your convenience all disk programs can be backed up.

State Of The Art

All **Library** programs are written in machine code specifically for the Color Computer, to work without the interference of a separate operating system such as FLEX. From this comes speed and more workspace for you. Unlike other programs for the Color Computer which are said to be 64K compatible, **VIP Library™** programs are not limited to between 24 and 30K of workspace in 64K. **Library** programs have Memory Sense with BANK SWITCHING to fully use all 64K, thus giving up to 51K with a disk version and up to 53K with a tape version.

Easy To Use

Each **Library** program was carefully designed to be extremely easy to use. Built-in on-screen help tables are at your fingertips, as are menus of all kinds. Every effort is made to use logical, intuitive and easy-to-remember commands. The manuals have been thoughtfully prepared to cover every aspect of the program, and they have complete tutorials to get you going right away. We set the standard!

Lowercase Displays

State-of-the-Art graphics allow instant use of four display colors, and eight lowercase displays featuring descending lowercase letters. You can select from 51, 64 or 85 columns by 21 or 24 lines per screen, with wide or narrow characters in the 64 display. These screens provide a pleasant and relaxing way to perform your tasks, with as much text on the

...PICTURE getting your instantaneous investment report over the phone, using it in your spreadsheet calculation, generating a report, and writing a memo including that report and data from your database with your word processor, and all this with VIP Library™ programs . . .

screen as is possible. Each program is easy to learn and a joy to use. We take pride in the stringent testing done to make these programs perform flawlessly. Every feature, every convenience, sleek, simple and elegant.

Total Compatibility

All **Library** programs are compatible. Transfer and use of files between programs is easy and carefree. What's better, when you have learned one program the others will come easy. And every program is the best of its kind available.

The Library Programs

For your writing needs is the **VIP Writer™**, and its spelling checker, the **VIP Speller™**. For financial planning and mathematical calculations you can use the **VIP Calc™**. To manage your information and send multiple mailings there is the **VIP Database™**. For sending all these files to and from home or the office and for talking to your friends you can have the **VIP Terminal™**. Finally, to fix disks to keep all your **Library** files in good repair we offer the **VIP Disk-ZAP™**.

Mini Disk Operating System

The Disk versions each have a Mini Disk Operating System which will masterfully handle from 1 to 4 drives. It offers smooth operation for such features as the ability to read a directory, display free space on the disk, kill files, save and automatically verify files, and load, rename and append files. **Library** programs simply do not have the limitations of BASIC.

Professionalism

The **Library** comes handsomely bound in gold-embossed, padded leatherette binders to grace your work area with the professionalism it deserves. Welcome the **VIP Library™** into your home and office.

A description of each of the **Library** programs, with the special sale price, is contained in the following pages. Please indulge!

VIP Writer™

(Formerly Super "Color" Writer II)

By Tim Nelson

RATED TOPS IN RAINBOW, HOT COCO, AND COLOR COMPUTER MAGAZINE

The Official Dragon Microcomputer Word Processor†

The most powerful and easy-to-use word processor is available in the showpiece and workhorse of the Library: The VIP Writer™. Because of its undisputed superiority over all Color Computer word processors, it was selected by Dragon Data Ltd. of England and TANO in the U.S., to be the Official Word Processor for their line of Dragon microcomputers.

The result of two years of research, the VIP Writer™ offers every feature you could desire from a word processor. It is the most powerful, fastest, most dependable and most versatile. With the hi-res display, workspace and compatibility features built into the Library the Writer is also the most usable.

"... Nearly every feature and option possible to implement on the Color Computer. The design of the program is excellent; the programming is flawless ... Features for the professional, yet it is easy enough for newcomers to master ... Certainly one of the best word processors available for any computer ..." October 1983 "Rainbow"

"Word processing with VIP Writer is like driving a high-performance vehicle ... This Ferari of a package has more features than Telewriter, Easywriter (for the IBM PC), or Applewriter." October 1983 "Hot CoCo"

The Writer will work with you and your printer to do things you always wanted to do. Every feature of your printer can be put to use, every character set, every graphics capability at any baud rate, EVEN PROPORTIONAL SPACING. All this with simplicity and elegance. You can even automatically print multiple copies.

Although all versions feature tape save and load, the disk version provides the Mini Disk Operating System common to the whole Library, plus disk file linking for continuous printing.

Professional features of particular note:

- Memory-Sense with BANK SWITCHING to fully utilize 64K, giving not just 24 or 30K, but up to 61K of workspace with the rompak version and 50K with the disk version.
- TRUE FORMAT WINDOW allowing you to preview the printed page ON THE SCREEN BEFORE PRINTING, showing centered lines, headers, FOOTNOTES, page breaks, page numbers, & margins in line lengths of up to 240 characters. It makes HYPHENATION a snap.
- A TRUE EDITING WINDOW in all 9 display modes for those extra wide reports and graphs (up to 240 columns!).
- FREEDOM to imbed any number of PRINTER CONTROL CODES anywhere. EVEN WITHIN JUSTIFIED TEXT.
- Full 4-way cursor control, sophisticated edit commands, the ability to edit any BASIC program or ASCII textfile, SEVEN DELETE FUNCTIONS, LINE INSERT, LOCATE AND CHANGE, wild card locate, up to TEN SIMULTANEOUS block manipulations, word wrap around, programmable tabs, display memory used and left, non-breakable space, and headers, footers and FOOTNOTES.
- Automatic justification, automatic pagination, automatic centering, automatic flush right, underlining, superscripts, subscripts, pause print, single-sheet pause, and print comments.
- Type-ahead, typematic key repeat and key beep for the pros, ERROR DETECTION and UNDO MISTAKE features, 3 PROGRAMMABLE functions, auto column creation, and an instant on-screen HELP TABLE.

32K (Comes with tape & disk) \$59.95

†Sold as the Dragon Writer™ ONLY by Dragon Data Ltd. and its distributors.

VIP Speller™

A BRAND NEW SPELLING CHECKER!

By Bill Argyros

Spelling checkers are an invaluable aid to every writer. Habitual misspellings and typos can be found without the eyestrain, boredom and fatigue associated with endless proofreading. The VIP Speller™ is a fast, machine-code proofreading program to correct any VIP Library™ file. It automatically proofreads your documents against a 30,000 word stock dictionary, plus a dictionary you can create, and corrects typos or marks them for special attention. Unlike other spelling checkers, the new VIP Speller distinguishes between upper and lowercase letters, and it shows the misspelled word in context so you can be sure of your correction. Compatible with all CoCo word processors.

32K DISK ONLY \$39.95

Lowercase displays not available with this program.

VIP

TM

Library

VIP Calc™

(Formerly Super "Color" Calc)

TRUE VISICALC™ POWER!

By Kevin Herrboldt

- UP TO 5 TIMES THE SCREEN DISPLAY AREA OF OTHER SPREADSHEETS!
- STATE OF THE ART LOWERCASE DISPLAYS
- MEMORY SENSE WITH BANK SWITCHING FOR UP TO 40+K in 64K!
- EXCLUSIVE VIDEO DISPLAY WINDOWS — EVEN UP TO 16!
- USER-DEFINABLE WORKSHEET — UP TO 512 COLUMNS BY 1024 ROWS
- WORKS WITH ANY PRINTER, EVEN LETTER QUALITY!
- LOCATE COMMAND TO FIND SPECIFIC NUMBERS, LABELS OR FORMULAS
- SORT COMMAND FOR EASY RANKING OF RESULTS
- ALMOST UNLIMITED PROGRAMMABLE FUNCTIONS

VIP Calc™ is truly the finest and easily the most powerful electronic worksheet and financial modeling program available for the Color Computer. Now every Color Computer owner has access to a calculating and planning tool better than VisiCalc™, containing all its features and commands and then some, WITH USABLE DISPLAYS. Use Visicalc templates with VIP Calc™!

There's nothing left out of VIP Calc™. Every feature you've come to rely on with VisiCalc™ is there, and then some. You get up to 5 TIMES the screen display area of other spreadsheets for the Color Computer and Memory-Sense with BANK SWITCHING to give not just 24, or 30, but UP TO 61K OF WORKSPACE IN 64K!!! This display and memory allow you the FULL SIZE, USABLE WORKSHEETS you require. You also get: User definable worksheet size, up to 512 columns by 1024 rows! * Up to SIXTEEN VIDEO DISPLAY WINDOWS to compare and contrast results of changes * 15 DIGIT PRECISION * Sine, Cosine and other trigonometric functions, Averaging, Exponents, Algebraic functions, and BASE 2, 8, 10 or 16 entry * Column and Row, Ascending and Descending SORTS for comparison of results * LOCATE FORMULAS OR TITLES IN CELLS * Easy entry, replication and block moving of frames * Global or Local column width control up to 78 characters width per cell * Create titles of up to 255 characters per cell * Limitless programmable functions * Typematic Key Repeat * Key Beep * Typeahead * Print up to 255 column worksheet * Prints at any baud rate from 110 to 9600 * Print formats savable along with worksheet * Enter PRINTER CONTROL CODES for customized printing with letter quality or dot matrix printer * Combine spreadsheet tables with VIP Writer™ documents to create ledgers, projections, statistical and financial reports and budgets.

Both versions feature Tape save and load, but the disk version also has the Mini Disk Operating System of the entire Library.

32K (Comes with tape & disk) \$59.95

does not allow hi-res display in 32K

NEW SALE PRICES!

Check These Library Features:

- Fully CoCo 2 Compatible
- Nine Display Formats: 32 by 16
51, 64, 85 by 21 or 24
- True Lowercase & Descenders
- Four Different Display Colors
- 32 & 64K Compatible
- Memory Sense - Bank Switching
- Up to 51K Disk, 53K Tape
- Mini Disk Operating System
- Compatible With All Printers

A SPECIAL OFFER ON THE WHOLE LIBRARY —

The entire Library, all six great disk programs, can be purchased for only **\$300!**

VIP Terminal™

(Formerly Super "Color" Terminal)

RATED BEST IN JANUARY 1984 "RAINBOW!"

By Dan Nelson

From your home or office you can join the communication revolution. The **VIP Terminal™** opens the world to you. You can monitor your investments with the Dow Jones Information Service, or broaden your horizons with The Source or Compuserve, bulletin boards, other computers, even the mainframe at work.

For your important communication needs you've got to go beyond software that only lets you chat. You need a smart terminal so that you can send and receive programs, messages, even other **VIP Library** files. **VIP Terminal**, the official Dragon microcomputer terminal, does much more than any other terminal and does it reliably. None can compare in features.

FEATURES: Choice of 8 hi-res lowercase displays * Memory-Sense with BANK SWITCHING for full use of workspace * Selectively print data at baud rates from 110 to 9600 * Full 128 character ASCII keyboard * Automatic graphic mode * Word mode (word wrap) for unbroken words * Send and receive **Library** files, Machine Language & BASIC programs * Set communications baud rate from 110 to 9600, Duplex: Half/Full/Echo, Word length: 7 or 8, Parity: Odd/Even or None, Stop Bits: 1-9 * Local linefeeds to screen * Save and load ASCII files, Machine Code & BASIC programs * Lowercase masking * 10 Keystroke Multiplier (MACRO) buffers to perform repetitive pre-entry log-on tasks and send short messages * Programmable prompt or delay for send next line * Selectable character trapping * Send up to ten short messages (KSMs), each up to 255 characters long, automatically, to save money when calling long distance.

All versions allow tape load and save of files and KSMs, but the disk version also has the Mini Disk Operating System common to the **Library**.

32K (Comes with tape & disk) \$49.95

16K RomPak (While they last) \$49.95

(Tape does not allow hi-res displays in 16K)

SoftLaw

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Minneapolis, Minnesota 55420 U.S.A.

TRS-80 is a trademark of Tandy Corp. VisiCalc is a trademark of VisiCorp.

**AUTHOR'S SUBMISSIONS
ARE ENCOURAGED.**

VIP Database™

(Formerly Super "Color" Database)

INCLUDES MAIL MERGE CAPABILITIES TOO!

By Tim Nelson

This high speed MACHINE LANGUAGE program fills all your information management needs, be they for your business or home. And it does so better than any other database program for the Color Computer, featuring machine code, lowercase screens and mailmerge capabilities. Inventory, accounts, mailing lists, family histories, you name it, the **VIP Database™** will keep track of all your data, and it will merge **VIP Writer™** files.

The **VIP Database™** features the **Library** Memory Sense with BANK SWITCHING and selectable lowercase displays for maximum utility. It will handle as many records as fit on your disk or disks. It is structured in a simple and easy to understand menu system with full prompting for easy operation. Your data is stored in records of your own design. All files are fully indexed for speed and efficiency. Full sort of records is provided for easy listing of names, figures, addresses, etc., in ascending or descending alphabetic or numeric order. Records can be searched for specific entries, using multiple search criteria. With database form merge you may also combine files, sort and print mailing lists, print "boiler plate" documents, address envelopes - the list is endless. The math package even performs arithmetic operations and updates other fields. Create files compatible with the **VIP Writer™** and **VIP Terminal™**. Unlimited print format and report generation with the ability to imbed control codes for use with all printers.

As with all other **Library** programs, the **Database** features the powerful Mini Disk Operating System.

32K DISK \$59.95

64K Required for math package.

VIP Disk-ZAP™

(Formerly Super "Color" Disk-ZAP)

RAVED ABOUT IN THE APRIL 1983 "RAINBOW!"

By Tim Nelson

Your database file disk, form letter disk, or BASIC program disk goes bad. An I/O error stops loading, or even backing up of the disk. Weeks, even months of work sit on the disk, irretrievable. Now catastrophic disk errors are repairable, quickly and with confidence, using the **VIP Disk-ZAP™**. It is the ultimate repair utility for simple and quick repair of all disk errors. Designed with the non-programmer in mind, the **VIP Disk-ZAP™** will let you retrieve all types of bashed files, BASIC and Machine Code programs.

This high-speed machine code disk utility has a special dual cursor screen display to look at the data on your disk. You are able to: Verify or modify disk sectors at will * Type right onto the disk to change unwanted program names or prompts * Send sector contents to the printer * Search the entire disk for any grouping of characters * Copy sectors * Backup tracks or entire disks * Repair directory tracks and smashed disks * Full prompting to help you every step of the way * 50-plus page Operators Manual which teaches disk structure and repair.

16K DISK \$39.95

Lowercase displays not available with this program.

Enter 31 on TeleResponse page 129



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Available at Dealers everywhere.

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MAIL ORDERS: \$3.00 U.S. Shipping (\$5.00 CANADA; \$10.00 OVERSEAS). Personal checks allow 3 weeks.

All Disk Programs are also available on 3" Diskettes for the Amdek Color AMDISK-III Micro-Floppy Disk System for an additional \$3.00 each.

©1983 by Softlaw Corporation

Line Number	Address	Object Code	Mnemonic	Operand	Jake's Comment	Line Number	Address	Object Code	Mnemonic	Operand	Jake's Comment
03082	B87C 0F 42		CLR	<\$42	;REM delimiter	03158	B91B 27 48		BEQ	\$B965	;If end of line
03083	B87E A6 80		LDA	,X+	;Get next character	03159	B91D 81 A4		CMPA	#\$A4	;TAB?
03084	B880 27 D0		BEQ	\$B852	;If end of line	03160	B91F 27 5D		BEQ	\$B97E	;Yes
03085	B882 91 42		CMPA	<\$42	;Delimiter?	03161	B921 81 2C		CMPA	#\$2C	;Column tab?
03086	B884 27 CC		BEQ	\$B852	;If so	03162	B923 27 41		BEQ	\$B966	;Yes
03087	B886 A7 C0		STA	,U+	;To buffer	03163	B925 81 3B		CMPA	#\$3B	;Semicolon?
03088	B888 20 F4		BRA	\$B87E	;Get next character	03164	B927 27 6E		BEQ	\$B997	;Yes
03089	B88A 81 30		CMPA	#\$30	;ASCII zero?	03165	B929 BD B156		JSR	\$B156	;Else compute expression
03090	B88C 25 04		BLO	\$B892	;If less	03166	B92C 96 06		LDA	<6	;Variable type
03091	B88E 81 3C		CMPA	#\$3C		03167	B92E 34 02		PSHS	A	;Save it
03092	B890 25 C0		BLO	\$B852	;If \$30 to \$3B	03168	B930 26 06		BNE	\$B938	;If string
03093	B892 30 1F		LEAX	-1,X	;Pointer to this character	03169	B932 BD BDD9		JSR	\$BDD9	;Convert FPAC1 to string
03094	B894 34 50		PSHS	X,U	;Save it & the translate buffer	03170	B935 BD B516		JSR	\$B516	;String info to string stack
03095	B896 0F 41		CLR	<\$41	;Initialize table number	03171	B938 8D 65		BSR	\$B99F	;Print string at X
03096	B898 CE 0116		LDU	#\$0116	;=> Indirect vocab table ptr	03172	B93A 35 04		PULS	B	;Restore variable type
03097	B89B 0F 42		CLR	<\$42	;Initialize token	03173	B93C BD A35F		JSR	\$A35F	;Initialize output parameters
03098	B89D 33 4A		LEAU	\$0A,U	;=> Table infomation	03174	B93D 0D 6E		TST	<\$6E	;Video?
03099	B89F A6 C4		LDA	,U	;Number of table entries	03175	B941 27 06		BEQ	\$B949	;Yes
03100	B8A1 27 31		BEQ	\$B8D4	;If no table entries	03176	B943 8D 13		BSR	\$B958	;Print carriage return
03101	B8A3 10AE41		LDY	1,U	;=> Vocabulary table	03177	B945 9D A5		JSR	<\$A5	;Parse current char
03102	B8A6 AE E4		LDX	,S	;Buffer pointer	03178	B947 20 D2		BRA	\$B91B	;Continue Print command
03103	B8A8 E6 A0		LDX	,Y+	;Char from vocabulary table						
03104	B8AA E0 80		SUBB	,X+	;Same as buffer char?	03179	B949 5D		TSTB		;String variable?
03105	B8AC 27 FA		BEQ	\$B8A8	;Yes, do next	03180	B94A 26 08		BNE	\$B954	;Yes
03106	B8AE C1 80		CMPB	#\$80	;End of word?	03181	B94C 9D A5		JSR	<\$A5	;Parse current char
03107	B8B0 26 38		BNE	\$B8EA	;No, word match failed	03182	B94E 81 2C		CMPA	#\$2C	;Comma?
03108	B8B2 32 62		LEAS	2,S	;Buffer pointer from stack	03183	B950 27 14		BEQ	\$B966	;Yes do column tab
03109	B8B4 35 40		PULS	U	;Restore encode buffer pointer	03184	B952 8D 58		BSR	\$B9AC	;Else print space
03110	B8B6 DA 42		ORB	<\$42	;Token to B	03185	B954 9D A5		JSR	<\$A5	;Parse current char
03111	B8B8 96 41		LDA	<\$41	;Doing second table?	03186	B956 26 C5		BNE	\$B91D	;If not End Of Line, cont PRINT
03112	B8BA 26 06		BNE	\$B8C2	;Yes, prefix token with \$FF	03187	B958 86 0D		LDA	<\$0D	;Carriage return
03113	B8BC C1 84		CMPB	#\$84	;ELSE?	03188	B95A 20 55		BRA	\$B9B1	;Print c/r
03114	B8BE 26 06		BNE	\$B8C6	;No						
03115	B8C0 86 3A		LDA	#\$3A	;Else insert colon	Print carriage return if necessary					
03116	B8C2 ED C1		STD	,U++	;Prefix the token	03189	B95C BD A35F		JSR	\$A35F	:Reset output parameters
03117	B8C4 20 94		BRA	\$B85A	;Continue encode	03190	B95F 27 F7		BEQ	\$B958	;Print carriage return
03118	B8C6 E7 C0		STB	,U+	;Token to buffer	03191	B961 96 6C		LDA	<\$6C	;Is it the middle of the line?
03119	B8C8 C1 86		CMPB	#\$86	;DATA?	03192	B963 26 F3		BNE	\$B958	;Print carriage return if so
03120	B8CA 26 02		BNE	\$BBC	;No	03193	B965 39		RTS		
03121	B8CC 0C 44		INC	<\$44	;Else flag it						
03122	B8CE C1 82		CMPB	#\$82	;REM?	Column tab					
03123	B8D0 27 AA		BEQ	\$B87C	;If so, continue as literal copy	03194	B966 BD A35F		JSR	\$A35F	;Initialize output parameters
03124	B8D2 20 86		BRA	\$B85A	;Else continue as encode	03195	B969 27 0A		BEQ	\$B975	;If video output
03125	B8D4 CE 011B		LDU	#\$011B	;Next table	03196	B96B D6 6C		LDB	<\$6C	;Line position
03126	B8D7 03 41		COM	<\$41	;Has second table been done?	03197	B96D 01 6B		CMPB	<\$6B	;Past maximum tab?
03127	B8D9 26 C0		BNE	\$B89B	;No, try it	03198	B96F 25 06		BLO	\$B977	;No, do TAB
03128	B8DB 35 50		PULS	X,U	;Char ptr & translate bufr ptr	03199	B971 8D E5		BSR	\$B958	;Else print carriage return
03129	B8DD A6 80		LDA	,X+	;Copy character...	03200	B973 20 22		BRA	\$B997	;Parse next char, cont PRINT
03130	B8DF A7 C0		STA	,U+	;to translated buffer	03201	B975 06 6C		LDB	<\$6C	;Line position
03131	B8E1 BD B3A2		JSR	\$B8A2	;Character = "A" - "Z"?	03202	B977 00 6A		SUBB	<\$6A	;Subtract column width
03132	B8E4 25 EC		BLO	\$B8D2	;No, continue encode	03203	B979 24 FC		BRS	\$B977	
03133	B8E6 03 43		COM	<\$43	;Else flag possible variable	03204	B97B 50		NEGB		
03134	B8E8 20 E8		BRA	\$B8D2	;Continue encode	03205	B97C 20 10		BRA	\$B98E	
03135	B8EA 0C 42		INC	<\$42	;Bump the token	03206	B97E BD B709		JSR	\$B709	
03136	B8EC 4A		DECA		;Done all table?	03207	B981 81 29		CMPA	#\$29	
03137	B8ED 27 AE		BEQ	\$B89D	;Yes, try next	03208	B983 1026 F8F0		LBNE	\$B277	
03138	B8EF 31 3F		LEAY	-1,Y	;Push to word end in table	03209	B987 BD A35F		JSR	\$A35F	
						03210	B98A D0 6C		SUBB	<\$6C	

```

03139 B8F1 E6 A0 LDB Y+ BLS $B997 ;Yes, ignore tab
03140 B8F3 2A PC BPL $B8F1 ;Is the output device video?
03141 B8F5 20 AF BRA $B8A6 ;No, don't tab

PRINT# 03142 B8F7 27 5F BBQ $B958 ;If PRINT c/r
03143 B8F9 8D 03 BBR $B8FE ;Do the Print
03144 B8FB 0F 6F CLR <$6F ;Reset to video output
03145 B8FD 39 RTS RTS ;Parse next char
                                         ;Continue with PRINT statement

PRINT# and PRINT@ 03146 B8F1 81 40 CMPA #$40 ;PRINT#?
03147 B900 26 05 BNE $B907 ;No
03148 B902 BD AS54 JSR $A554 ;Set cursor for PRINT@
03149 B905 20 0A BRA $B911
03150 B907 81 23 CMPA #$23 ;PRINT#?
03151 B909 26 0D BNE $B918
03152 B909 BD AS55 JSR $A5A5 ;Get device number
03153 B90E BD AA06 JSR $A406 ;Check if file open for output
03154 B911 9D A5 JSR <$A5 ;Get next character
03155 B913 27 43 BEQ $B958 ;If End Of Line, print C/R
03156 B915 BD B26D JSR $B26D ;Syntax check for ","
03157 B918 BD 0179 JSR $0179 ;RAM vector

PRINT (=X) 03211 B98C 23 09 BLS $B997 ;String info to string stack
03212 B98E 0D 6E TST $C6E ;Copy to string space if req'd
03213 B990 26 05 BNE $B997 ;Adjust for loop
03214 B992 8D 18 BSR $B9AC ;Done all tab blanks?
03215 B994 5A DEC B ;Print a blank
03216 B995 26 FB BNE $B992 ;Continue if not
03217 B997 9D 9F JSR <$9F ;Parse next char
03218 B999 7E B91B JMP $B91B ;Continue with PRINT statement

PRINT@ 03219 B99C BD B518 JSR $B518 ;String info to string stack
03220 B99F BD B657 JSR $B657 ;Copy to string space if req'd
03221 B9A2 5C INC B ;Adjust for loop
03222 B9A3 5A DEC B ;Done all characters
03223 B9A4 27 BP BEQ $B965 ;RTS if no more characters
03224 B9A6 A6 80 LDA ,X+ ;Get character
03225 B9A8 00 07 BSR $B9B1 ;Print character
03226 B9AA 20 P7 BRA $B9A3 ;Do next one
03227 B9AC 86 20 LDA $20 ;Space character
03228 B9AE 8C 863F CMPX $S863P ;Mask for following opcode
03229 B9AF 8E 3F LDA $3P ;Load A with a "?"
03230 B9B1 7E A282 JMP $A282 ;Print character in A

```

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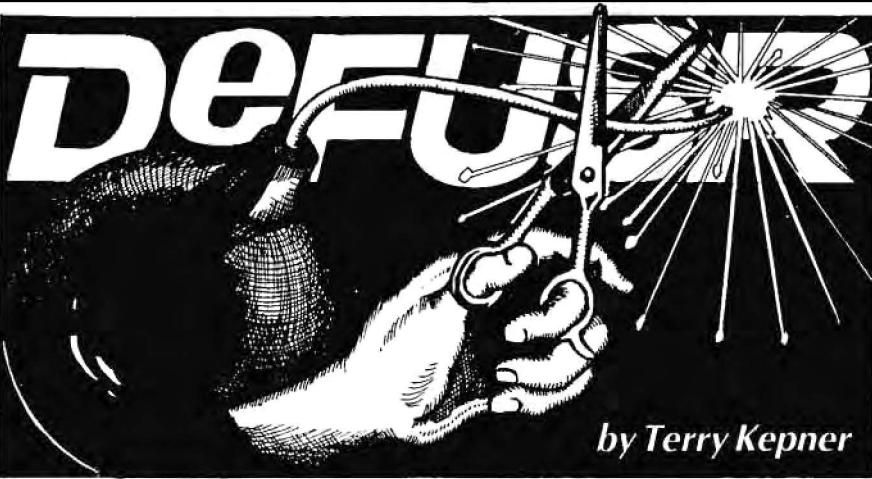
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by Terry Kepner

I have Color Basic 1.1 and Extended Basic 1.0. I enjoy Jake Commander's articles on the ROM disassembly, but his disassembly is different from mine! What gives?

Also, when I type "POKE 25,6:NEW: ?MEM" I see 14631 and everything works fine. If I also POKE 26,0:NEW I get a syntax error, although ?MEM shows 14631. I can CLOAD a program, but RUN gives a syntax error. What's happening?

—R.C., Annapolis, MD

The disassembly we're using is of Color Basic 1.0. The differences you note between our disassembly and yours are a reflection of the alterations made in the ROM when Radio Shack upgraded the ROM from 1.0 to 1.1. Most of these differences are minor, such as changing the printer output from 7 bit to 8 bit words for graphics.

"POKE 25,6:NEW" eliminates graphics page one, because the Basic command PCLEAR won't accept an argument of zero. Without this POKE, you would be stuck with a 1.5K graphics page (which you don't want). The addresses 25 and 26 contain the 16-bit address of the lowest RAM byte available to Basic. By POKE-ing 26 with a zero, you move the bottom of Basic even lower, right into the area used by the ROM as a scratchpad memory of important information. Destroying this information makes the computer unreliable. Some things will work, others won't.

I have a 32K Color Computer. Is there a way to interface my computer so that I can receive and transmit ham radio code via the keyboard rather than a Morse key pad? Second, I have a Ball monitor Model TV-9, is there a way to use it with my TRS-80?

—Keven Ferris

Yes, you can key code from your keyboard. The KA9FSQ CW Modem Interface (Mitronix, 5953 N. Teutonia Ave., Milwaukee, WI, 53209) will do the job. The device is easy to use. Plug it into your cartridge slot, attach the two connectors (send and receive) to your rig, CLOAD the program, and then run it for action! An LED is mounted on top of the unit to give a visual indication of whether you're properly locked onto the signal. The unit retails for \$50.

Computerware (Box 668, Encinitas, CA, 92024, (619)436-3512) sells a device called Video Plus (\$24.95). Video Plus is a fully assembled unit that attaches to your computer and converts the signals to a video signal acceptable to most monitors. For more information, call Computerware.

I'm interested in building my own cartridges for my Color Computer. Which EPROMs should I use? Do I need any other parts? Can I use the same PC layout that Radio Shack uses?

—J.S., Freeland, PA

The EPROMs you want to use are the 2716 and 2732 chips. Unfortunately, these EPROMs won't work in the Radio Shack cartridge; however, you can buy a bare printed circuit board for \$15.00 from Green Mountain Micro (Roxbury, Vermont, 05669, (802)485-6112). This board accepts standard ROMs or G116 RAM chips and will plug into the Color Computer cartridge slot.

PBJ Inc. (Box 813, N. Bergen, NJ, 07047, (701)330-1898) also sells a prototyping board (\$10.95) that lets you build your own circuitry to plug into the ROM port.

Other than the EPROM and PC board, all you need is an IC socket and package cover (available for \$5.50 from Color-

ware Inc., 78-03A Jamaica Ave., Woodhaven, NY, 11421, (212)647-2864). If you intend to switch EPROMs frequently, use a zero-insertion force socket. It's more expensive, but worth the money to protect your chips from bent-pins.

A complete PROM-burning prototyping system is available for \$149 from Prototech, Inc., Box 12104, Boulder, CO 80303.

In some of your articles and advertisements, especially the ads for memory expansions, there are cryptic references to "revision E," "revision NC," and so forth. What do these mean? And how do I determine which one I have?

—E.S., Vancouver, WA

Nothing is ever perfect, not even circuit boards and ROM chips. The revision letters mark different points in the development of the Color Computer. The first board was labeled Revision A. Since then, Radio Shack has released versions B, C, D, E, F, NC, and NR revision boards. Each is different from its predecessor in some manner. The major differences occur after the D board: the printed circuit components are laid out differently, the RFI shield has a new shape, the Color Basic ROM has been changed to 1.1, and the memory expansion is capable of reaching 64K RAM without requiring solder cuts or adding wire jumpers.

There's no sure way to determine which board you have unless you open the unit and examine the circuit board (the revision label is on the side with the components, just below the cartridge slot). As a crude approximation, type EXEC 41175; if you get the response Color BASIC 1.1, you probably have revision E or above. If the response is COLOR BASIC 1.0, you have one of the earlier board revisions. The latest 64K Color Computers respond with: Color Basic 1.2

If you have one of the earlier revisions, which were limited to only 16K RAM, and you take it to Radio Shack for upgrading to 32K, the technician will just remove the circuit board and replace it with a new, higher revision board, probably the NC board which can operate with 32K RAM.

Could you please tell me if there is any way I can get the Extended Basic chip other than through Radio Shack? Also, one of your advertisers sells 64K RAM chips and says they're "Fac-

tory Prime Chips." What does that mean?

—D.D., Camp Hill, PA

The only source for the Extended Basic ROM is Radio Shack, but you don't have to take it in to the repair center for the chip to be installed. If you prefer, you can call Radio Shack National Parts (900 East Northside Dr., Fort Worth, TX, 76102, (817)870-5662), order the chip, and install it yourself. All you lose is the 90-day warranty. Of course, if you open your computer you'll void the Radio Shack warranty on it. The chip costs \$64.16; order part number AXX3054.

If you want the full upgrade kit, not just the chip, order 26-3018 (\$99). You get the Extended Basic chip, and the Extended Basic manual. For more detailed instructions on performing the upgrade, see Dennis Kitsz's March, 1983, "Custom Color" column.

"Factory prime" usually refers to the claim that these chips are the best possible, from the top of the manufacturing line. That's by comparison with chips which are slower, not as temperature resistant, or failed part of the factory's quality control in some way. Generally, factory prime chips are more expensive than the others.

I'm just learning machine language on an Apple II. I own a 32K Color Computer with Extended Basic, but I'm unsure what memory locations are open for me to work in. I'm afraid I'll mess up my computer if I POKE the wrong location.

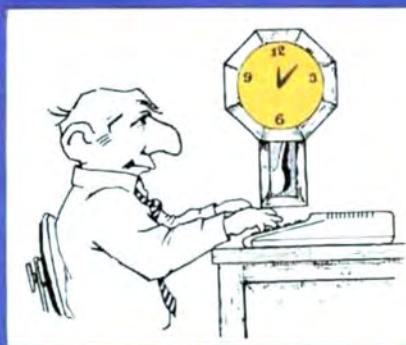
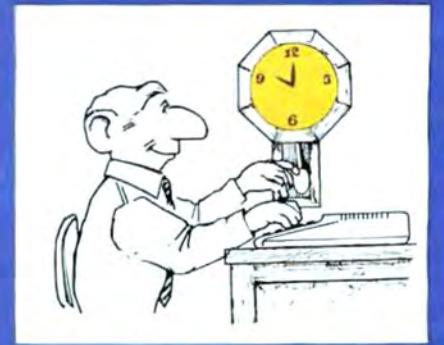
—D.L., Evansville, IN

First the machine code used in an Apple is different from the code used in the Color Computer. The Apple II uses the 6502 CPU as its brain, the Color Computer uses the 6809E. The same code, say EF, is interpreted differently by each chip, so you can't really transfer what you're learning directly to the Color Computer. However, the techniques of programming are similar no matter which CPU chip you use, so all is not lost.

Next, nothing you can POKE into memory is going to damage the computer, unless you use a hammer or axe to do the POKEing! The worst you can do is make your computer go temporarily "insane." To cure it, turn it off for a few minutes, then turn it back on. The only penalty to this is that any data or programs in memory will be wiped out and have to be re-entered.

The memory map of the Color Computer is quite simple: the first "page" of

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memory, locations 0 to 1023 are used by Basic and the operating system as a scratchpad memory, tracking such information as the keyboard typing buffer, the name of the last cassette program/file loaded, interrupt vectors, and so forth. The next locations, 1024 to 1535, are your video text memory locations.

Anything placed here appears on the video screen. From 1536 to 3071 is your first extended graphics screen memory (PCLEAR1). 3072 to 4607 is the second graphics page (PCLEAR2). Basic user RAM starts immediately after the last graphics page you've initialized.

Since the graphics pages are primarily used by Basic, they are meaningless to machine language programs, so you can start storing your machine code immediately after the end of video text memory, location 1535 (05FFH). Top of user memory is at 32767 (7FFFH) in a 32K RAM system. From 32768 (8000H) to 40959 (9FFFH) is Extended Color Basic ROM, from 40960 (A000H) to 49151 (BFFFH) is Color Basic ROM. Cartridge ROM runs from 49152 (C000H) to 65279 (FEFFH). From 65280 (FF00H) to 65536 (FFFFH) are control registers memory-mapped to different devices and ports. For information on the last, refer to the back of your Color Basic manual.

Also, be sure to watch Jake Commander's ROM disassembly; it'll give you many pointers on how to use the routines in ROM to speed up your own machine language programs.

I'm 14 years old, own a 16K Color Computer, and I want to upgrade to 32K. The problem is that I think the \$160 Radio Shack upgrade is too expensive. I've looked at the kits and articles on upgrading, and don't think I have enough electronics background to do the job myself. I've tried taking it to electronics shops, but they said they had no computer experience and would only do the work with step-by-step instructions. I don't want to pay Radio Shack \$160, but what can I do?

—C.B., Winterport, ME

Sounds like you're between a rock and a hard place, but help may be available. The October issue of **The Color Computer Magazine** has Dennis Kitsz's article on upgrading the various Color Computer boards to 32K and 64K. Get that issue and take it to the repair shops and ask them if the instructions in his article are good enough for upgrading your

computer. I think you'll find that they'll be able to do the job for you now. If that doesn't work, I don't know what else to suggest, except to try it yourself. It's really not all that hard, just tedious and nerve wracking. As long as you carefully examine your work after each step, and maybe practice with other electronics first, you should be able to do it. As always, be aware that opening your computer will void its warranty.

In the March issue is a review of the TDP-100 by Bob Rosen, in which he says some of the later model Color Computers use the same board as the TDP-100. In looking at mine, I have three jumpers positioned for 16K, with provision for 64K. Bob's article says that all I have to do to get 64K is move the jumpers and remove some capacitors. Which ones?

I have the latest Color Computer, and the TDP board. Also, what do I do to upgrade to Extended Basic?

—T.D., Vermilion, OH

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numbers C31, C35, C45, C48, C61, C64, and C67, all of which are mounted beside the RAM sockets. More information about upgrading Color Computers is in the October, 1983, "Custom Color" column (also, to get the 64K RAM, you must have 64K chips in the sockets. If your computer is 32K, you already have the right chips. If you have a 16K computer, you'll need to buy a set of 64K chips).

For information about upgrading to Extended Basic, see the previous letter in this column on that subject.

I'm writing a terminal program for my Color Computer. I need to know how to input from the RS-232 port. I know of one memory location that can be used, but it shows only one bit at a time. Is there a ROM routine that will assemble the individual bits into ASCII characters for me?

—J.V., Galloway, OH

No. You'll have to write your own routine for converting the incoming data to ASCII characters. The only ROM routines are those for outputting data through the RS-232 to a printer. The Color Basic routine starts at A2BFH and runs to

A30BH. The July, 1983, issue contains a disassembly of those ROM locations.

I own a 32K Color Computer with Extended Basic. Is it possible to interface the Color Computer to the Radio Shack VoxBox?

—P.N., St. Anthony, MN

I don't know of anyone who has done that yet. To do it would require a serial-to-parallel interface, since the VoxBox was designed to plug into the parallel bus port of the Model 1.

Can anyone help P.N.?

I have a problem with my Color Computer: the longer it's on the hotter it gets, until it bombs and the information on the screen gets scrambled. Is there any way I can install an air conditioner on the unit? What will happen if I leave the computer on for a long time? What's heating up and why?

—J.T., Salt Lake City, UT

First, you can get a fan from REM Industries or Spectrum, or rig your own muffin fan to blow air through the vent slots of your computer, making it oper-

ate at cooler temperatures. Second, operating the computer for extended periods of time while it's overheating will eventually cause the overheating components to just quit working completely (6809E CPU and SAM chips are the most sensitive). Last, the problem could be just that the CPU and SAM chips are more temperature sensitive than normal, or that you have a "sudden death" power supply.

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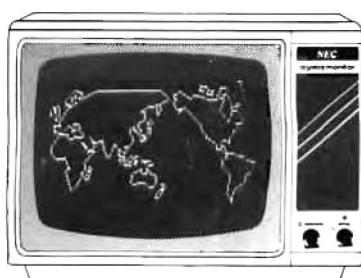
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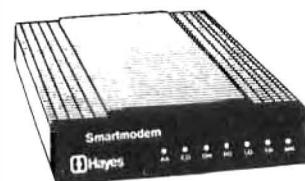
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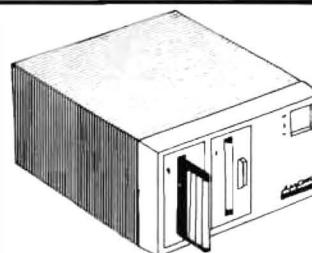
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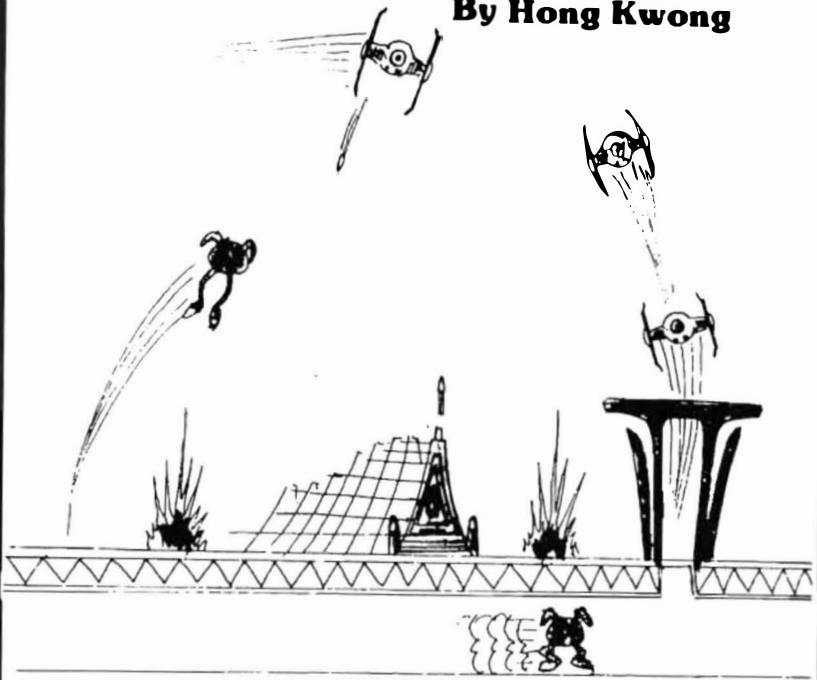
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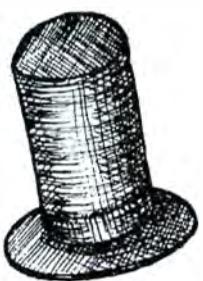
by Jean Plessner

EVERY FEBRUARY WE celebrate the birthdays of Presidents Lincoln and Washington. Have you ever wondered how old they would be this year? Or how many years it's been since each was elected President? Or, how about how many days 'til your own birthday or any other special event you're looking forward to?

Wait! Don't go looking for a pencil or a calculator. This month, with help from the INPUT and DIMensioning statements, we're going to let our computers do the math. In fact, these computer statements are so terrific I'm sure you'll soon be using them for many interesting programs. To help you get started, I've re-written the "String Mix-Up" program from our last article; it's now a nifty "Describe an Alien" program that lets *you* decide what the alien looks like. My valentine to you is a "Rainbow Heart" that you can color.

We have a lot to do, so let's get busy! You'll find this is a great way to beat those winter blahs. If you like a program you create, be sure to CSAVE it so you can continue to enjoy it.

♦ more





Variable Review

As we learned, a variable is used in a program to store numeric data (numbers) or string data (letters, symbols, or numbers). Variables can look like this:

```
A=7
CD=8
ZZ=10
G=4+6
N$="HELLO"
NB$="1 2 3"
X$="A,B,C & 1 2 3"
RW$="12 + 11 ="
```

There are many, many ways to write variables, but remember that numeric data is stored in variables of one or two letters, while string variables have one or two letters plus a \$.

You can assign data to a variable like this:

```
10 CLS
20 M$="FEBRUARY"
30 X=1984
40 PRINT M$;? X
```

And when you RUN the program it will PRINT:

```
FEBRUARY
1984
```

If you want the program to PRINT something else you must change the data following each variable. This works fine if you need to PRINT the same thing over and over again, or if you need the same number for calculations. If you want new data each time you RUN the program, this would be a lot of trouble, however. Computers were invented to save time for us, so a fast and easy way to continually change the data we store in variables was devised.

The Input Statement

The INPUT statement PRINTS a ? on the screen, letting us know the computer is waiting for us to enter data from the key-

board. The data is then stored in the variable assigned to the INPUT statement. The INPUT statement will also PRINT a message on the screen to tell the user (that's us, or whoever is using the program) what to enter. Here's an example:

```
10 CLS
20 INPUT "A NAME";N$
30 INPUT "A NUMBER";X
40 ?:? N$;? X
```

When you RUN this program, this message will appear on your screen: A NAME?. Type your name and press ENTER. Then, A NUMBER? will appear. Type any number and press ENTER. The computer will then PRINT N\$ (your name) and X (your number).

Each time you RUN this program the computer will erase the previous name (N\$) and number (X). Then when you INPUT new data the computer will store it in the variables. RUN the program several times to be sure of this.

Programs Can Be Friendly, Too

A program is called "user friendly" when it is easy for anyone who operates it to use. You can make your programs user friendly by taking the time to write clear messages in PRINT and INPUT statements that will help your users understand what to enter and what is being displayed.

Here's an example: the program will give the same results as our last program, but the added messages will help a user better understand the program:

```
10 CLS ?
20 ? "TYPE A NAME, THEN PRESS <ENTER>"
30 INPUT " —>";NS
40 ?:? "TYPE A NUMBER, AND PRESS <ENTER>"
50 INPUT " —>";X
60 CLS
70 ?:? "THE NAME YOU ENTERED IS: "
80 ?:? " ";NS
90 ?:? " —AND —"
100 ?:? "THE NUMBER YOU ENTERED IS: "
110 ?:? " ",X
```

How Old? How Long Since?

We're now ready to find out how old Lincoln and Washington would be this year, and also how many years it's been since each became president. Here's the variable list and the program:

The Variables

CY = The Current Year
Q\$ = Your Question
BY = The First, or Birth Year
A = The Computer's Answer

The Listing:

```
10 CLS?:CY=1984
20 ?"THIS PROGRAM WILL CALCULATE"
30 ?"AGE OR TIME SPANS."
40 ?:? "WHAT WOULD YOU LIKE ME"
50 ?"TO CALCULATE ..."
60 INPUT Q$
70 ?:? "WHAT IS THE BEGINNING YEAR"
80 INPUT "—>";BY
90 A=CY-BY
100 CLS:?
110 ?"YOUR QUESTION WAS: "
120 ?Q$?:?
130 ?"THE ANSWER IS: "
140 ?A;"YEARS"
150 END
```

When you RUN the program your screen will display:

```
THIS PROGRAM WILL CALCULATE
AGE OR TIME SPANS.
WHAT WOULD YOU LIKE ME
TO CALCULATE...
?
```

The computer is now waiting for you to ask it a question, and your answer will be stored in Q\$. Type: HOW OLD WOULD ABE LIN COLN BE THIS YEAR?. When you press ENTER, the computer will ask: WHAT IS THE BEGINNING YEAR?

Enter the year that Lincoln was born — 1809. When you press ENTER the computer will store this date in BY and will then do the calculations in Line 90,

where A will equal 1984 minus 1809, which is 175. The computer then clears the screen and displays your question and the answer.

Washington was born in 1732. If you want to know how long it's been since he was president ask the computer: HOW LONG SINCE GEORGE WASHINGTON BECAME PRESIDENT? Then, INPUT 1789 as the beginning year. Abraham Lincoln became President in 1861.

You can use this program for history dates, ages, anniversary years and how long it's been since any event. You can also find out ages or time spans for any future year by putting any other year in the variable CY.

You now have enough information to write some INPUT programs yourself. How about finding out the year that something began, or someone was born? Hint: The beginning year = the current year minus the age. Or, how about a program that calculates the year you'll graduate from high school, or college, or any other special year you're looking forward to? Hint: The future year = the current year plus the number of years until the special event.

There are countless possibilities for programs using INPUT statements, and there is even a way to store a list of INPUT entries in one variable. You may want to calculate a list of numbers, or print a list of names or telephone numbers, or make a list of your books or records, or... just about anything you can think of.

Hooray for Arrays!!

An array is an arrangement or order of something. You can have an array of colors, numbers, or anything else that can be displayed. The number of things you have in an array is the *dimension*, or size, of the array. For instance, if you had five things to arrange in a certain order, the dimension of your array would be five.

A computer program can create arrays, or lists, of string or numeric data. The DIM (dimensioning) statement is used to tell the computer the size of the array and the variable the list will be stored in. You use the same form of variables we have already learned.

Here's an example of this statement: DIM A(5). When the computer reads this line it will get ready to store a list of five numbers in the variable A. The first number will be stored in A(1), the second number in A(2), the third in A(3), then A(4) and A(5). The numbers in parentheses are called *subscripts*. Think of the subscripts as addresses. People can find your house out of all the other houses on your street by looking for the address.

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The variable would then be the street name and the subscripts would be like the address of each house.

Once we dimension an array in a computer program we can put data into it. Here's a program that will do this:

```
10 CLS  
20 DIM A(5)  
30 A(1) = 14  
40 A(2) = 9  
50 A(3) = 225  
60 A(4) = 62  
70 A(5) = 5588
```

When you RUN this program, the numbers after the equals sign will be placed in each subscripted A. To see this, add these lines to your program and RUN it:

```
80 ? A(3);? A(5);? A(2)  
90 ? A(1);? A(4)
```

You can PRINT the array in any order you like (as I just did). You can also put data into an array in any order you like. But if you are PRINTing subscripted data in order, the FOR/NEXT loop is helpful. Type these lines to replace 80 and 90:

```
80 FOR L = 1 TO 5  
90 ? A(L)  
100 NEXT L
```

Line 80 will make L equal to the numbers 1 to 5 (the number dimensioned).

Line 90 uses the number that L equals as the subscript's number. When L=1, A(1) will be printed; when L=2, A(2) will be printed, and so on.

Line 100 sends the computer back to Line 80 and adds one to the value of L.

You can use a FOR/NEXT loop to store data in an array also. Type NEW and try this program:

```
10 CLS  
20 DIM D$(7)  
30 ? "INPUT THE DAYS OF THE WEEK."  
40 FOR L = 1 TO 7  
50 INPUT D$(L)  
60 NEXT L
```

When you RUN the program, type SUN DAY at the first question mark, then press ENTER; type SATURDAY then press ENTER; etc. When you're finished add a FOR/NEXT loop to PRINT D\$ — use the last program as a guide.

The best way to learn anything is by doing it. As you see something work and all the pieces fit together you begin to get ideas of your own. Trying new things also means making mistakes and sometimes getting frustrated, but we also learn by our mistakes, so keep experimenting.

The rest of this article uses the information you've learned in three different programs. Each was designed to show you different possibilities for arrays and INPUT statements.

How Many Days Until?

This program (Listing 1) will calculate

the number of days from any date after February 1, 1984 to the date of a future event in 1984. The number of days in each month are stored in an array and used later for calculations. Check the variables in the program with the variable list as you enter each line — this will help you understand how the program works.

The variables:

Program Listing 1. How Many Days Until?

```
10 REM--HOW MANY DAYS UNTIL?  
20 DIM M(12)  
30 M(1)=31 : M(2)=29 : M(3)=31  
40 M(4)=30 : M(5)=31 : M(6)=30  
50 M(7)=31 : M(8)=31 : M(9)=30  
60 M(10)=31: M(11)=30: M(12)=31  
70 REM--INPUT SECTION  
80 CLS  
90 PRINT "THIS PROGRAM WILL TELL  
YOU HOW"  
100 PRINT "MANY DAYS THERE ARE U  
NTIL"  
110 PRINT "A SPECIAL EVENT IN 19  
84--"  
120 PRINT : PRINT "WHAT IS THE E  
VENT?"  
130 INPUT "---->";E$  
140 PRINT "WHAT IS THE MONTH OF  
THE EVENT?"  
150 INPUT "(1-12)--->";EM  
160 PRINT "WHAT IS THE DATE OF T  
HE EVENT?"  
170 INPUT "(1-31)--->";ED  
180 PRINT "WHAT IS THE CURRENT M  
ONTH?"  
190 INPUT "(1-12)--->";CM  
200 PRINT "WHAT IS THE CURRENT D  
ATE?"  
210 INPUT "(1-31)--->";CD  
220 REM--CALCULATION SECTION  
230 X = EM-1  
240 FOR L = CM TO X  
250 DM = DM + M(L)  
260 NEXT L  
270 TD = DM-CD+ED  
280 REM--DISPLAY OF CALCULATIONS  
  
290 CLS : PRINT : PRINT  
300 PRINT "THE NUMBER OF DAYS UN  
TIL-----"  
310 PRINT "----> ";E$  
320 PRINT : PRINT "ARE ---> ";TD  
  
330 END
```

M() — an array for the number of days in each month of 1984

E\$ — the name of the future event

EM — the month (by number) of the event

ED — the date of the event

CM — the current month (by number)

CD — the current date

X — one month before the event month, so that days that have not yet passed won't be included

DM — the total of the days of the months from current to event month

TD — the total days until the event

Array an Alien

The idea for this program (Listing 2) comes from the "Mix-Up" program we did last month. Because we can now use the DIM and INPUT statements, "Describe an Alien" is much shorter, yet it gives us more variety. You'll have a lot of fun with this one.

The Variables:

C\$() — names of colors

N() — numbers

S\$() — names of shapes

Program Listing 2. Array An Alien

```
10 REM--DESCRIBE AN ALIEN
20 DIM C$(3),N(3),S$(3)
30 CLS
40 PRINT " I NEED 3 COLORS..."
50 PRINT " AFTER EACH ---> TYPE
THE COLOR, THEN PRESS <ENTER>:"
60 PRINT : FOR L = 1 TO 3
70 INPUT "--->; C$(L)
80 NEXT L
90 CLS
100 PRINT " I NEED 3 NUMBERS..."

110 PRINT " AFTER EACH ---> TYPE
A NUMBER, THEN PRESS <ENTER>"

120 PRINT : FOR L = 1 TO 3
130 INPUT "--->; N(L)
140 NEXT L
150 CLS
160 PRINT " I NEED 3 SHAPES..."
170 PRINT " AFTER EACH ---> TYPE
A SHAPE, THEN PRESS <ENTER>"

180 PRINT : FOR L = 1 TO 3
190 INPUT "--->; S$(L)
200 NEXT L
210 CLS
220 PRINT : PRINT "YOUR ALIEN IS
"; C$(1); " WITH"
230 PRINT C$(2); " HAIR. HE HAS
"; N(1)
240 PRINT C$(3); " EYES ON A ";
S$(1); " HEAD."
250 PRINT "HE HAS A "; S$(2); "
BODY WITH"
260 PRINT N(2); " ARMS AND "; N(3)
); " LEGS."
270 PRINT "HE HAS HAIRY "; S$(3)
); " FINGERS"
280 PRINT "AND "; N(1); C$(3); "
"; S$(2); " TOES."
290 END
```

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A Graphics Review

Since we learned graphics last December, a quick review may be necessary before our next program. If you have a copy of that issue you may want to look back at the article. The SET command places a point on your screen in the color and at the horizontal and vertical position you specify. The format is: SET(H,V,C).

The location of each point is determined by using a graphics screen locations worksheet like the one found on page 278 of *Getting Started with Color Basic* (the book that came with your computer). The easiest way to draw lines is by using a FOR/NEXT loop that will move your horizontal or vertical position each time the loop repeats the SET com-

mand. Follow these examples to practice lines:

A horizontal line:
10 CLS(3)
20 FOR H=12 TO 50
30 SET(H,10,2)
40 NEXT H
50 GOTO 50

A vertical line:
100 CLS(6)
110 FOR V=4 TO 24
120 SET(28,V,8)
130 NEXT H
140 GOTO 140

Using different numbers in the FOR

Program Listing 3. Valentine

```

10 REM--RAINBOW HEART
20 DIM C(6) : CLS
30 PRINT "I NEED 6 COLORS:"
40 PRINT "TYPE A NUMBER FROM 1-8
AFTER"
50 PRINT "EACH --->, THEN PRESS
ENTER...."
60 PRINT : FOR L = 1 TO 6
70 INPUT "--->;C(L)
80 NEXT L
90 PRINT : CLS (0)
100 REM--USING COLOR #1
110 A = 16 : B = 20 : C = 40 : D
= 44
120 FOR V = 4 TO 7
130 FOR H = A TO B
140 SET (H, V, C(1))
150 NEXT H
160 FOR N = C TO D
170 SET (N, V, C(1))
180 NEXT N
190 A = A-1 : B = B+2 : C = C-2
: D = D+1
200 NEXT V
210 REM--USING COLOR #2
220 B = 26 : C = 34
230 FOR V = 8 TO 11
240 FOR H = 12 TO B
250 SET (H, V, C(2))
260 NEXT H
270 FOR N = C TO 48
280 SET (N, V, C(2))
290 NEXT N

```

statements and in the SET commands will change the position of your line. By putting several loops in one program you can draw shapes and pictures.

A Valentine

"Rainbow Heart" uses color numbers you INPUT to draw a heart in six different (or the same) colors.

The variables:

C() — the numbers of Color Basic's colors

A, B, C, D — are horizontal positions that will be added to, or subtracted from, before the next vertical line is drawn

V — vertical position

H — horizontal position

N — a second horizontal line drawn at

one vertical position. This happens at the top of the heart.

Drawing a heart can be confusing, but the results are really nice, so don't let it discourage you. Get someone to help type in the program if you need to, but try using the examples in the different loops to learn how to draw more than one line at a time.

We covered a lot of programming this time and you have plenty to keep you busy. Don't forget to try your own ideas, and save any programs you enjoy. Also, if you have a printer, use the printer command: PRINT # - 2, in place of any PRINT statements, so you can make lists now that you have experience with arrays.

See you next month with some statements that can make all your programs more interesting!



```

300 B = B+1 : C = C-1
310 NEXT V
320 REM--USING COLOR #3
330 A = 13 : B = 47
340 FOR V = 12 TO 15
350 FOR H = A TO B
360 SET (H, V, C(3))
370 NEXT H
380 A = A+1 : B = B-1
390 NEXT V
400 REM--USING COLOR #4
410 A = 16 : B = 44
420 FOR V = 16 TO 19
430 FOR H = A TO B
440 SET (H, V, C(4))
450 NEXT H
460 A = A+1 : B = B-1
470 NEXT V
480 REM--USING COLOR #5
490 A = 20 : B = 40
500 FOR V = 20 TO 23
510 FOR H = A TO B
520 SET (H, V, C(5))
530 NEXT H
540 A = A+1 : B = B-1
550 NEXT V
560 REM--USING COLOR #6
570 A = 24 : B = 36
580 FOR V = 24 TO 29
590 FOR H = A TO B
600 SET (H, V, C(6))
610 NEXT H
620 A = A+1 : B = B-1
630 NEXT V
640 GOTO 640

```



Enter41 on TeleResponse page 129

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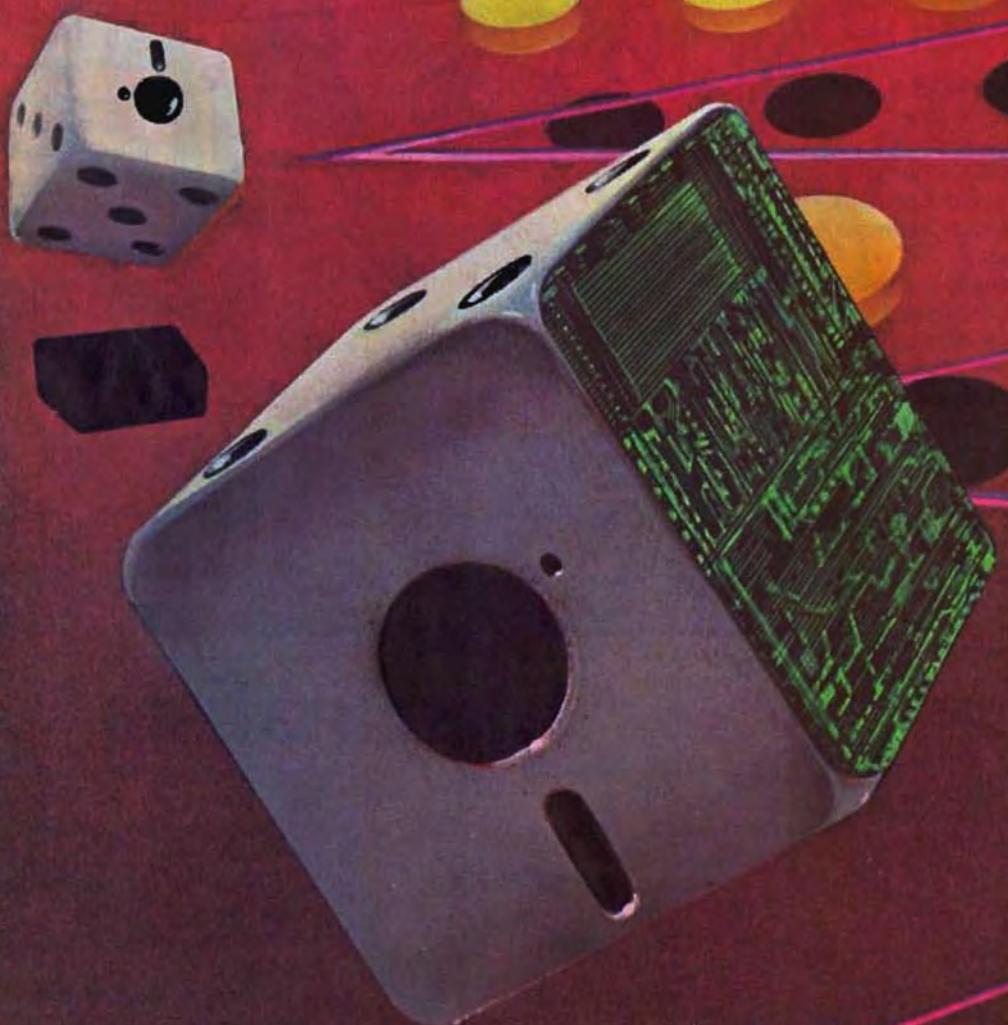
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The Contest



The Winners

HERE 'TIS FOLKS, what you've all been waiting for—the winners of the Summer Programming Project. Let me give you a little background information first.

For those of you who missed it, the Project was announced in the June 1983 issue; at the time, we expected we'd be able to judge the entrants shortly after the contest deadline of Labor Day, and announce the winners in the December issue. Boy, were we wrong!

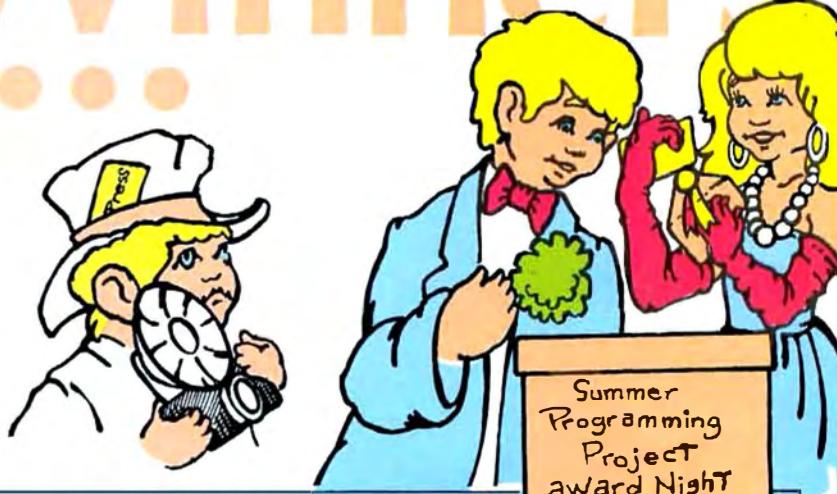
We had nearly 300 entrants, and many of those entrants made multiple game entries. We estimate there were close to 400 games to play—we're afraid to count the exact number! Beginning in late August we began the great Summer-Programming-Project-game-playing-and-judging marathon. Everyone here at the magazine was recruited at one time or another, as well as several sets of local teenage computer game and arcade enthusiasts, and employees' children who were also pressed into service.

We finally narrowed the field down to 32 finalists, and then the Marathon began in earnest. Teams of three game players played each finalist over an all day, all night, and all weekend game orgy, during five straight days. Each player rated each game—on enjoyability, ease of play, originality of game concept, speed where speed is important, completeness of directions, graphics, and so on.

The second runner up in the Basic category was a four-way tie between Jacobs, Smith, Vinnedge and Dahlgren, broken by our technical department in a decision based on technical elegance. Just to remind you of what prizes went to the winners, we'll reprint the prize boxes below.

And now, what we've all been waiting for—a chance to play the winning games! In this issue we'll present "Jackpot Poker" and "Whodunit?" The Grand prize winners will be published in the March issue, and the assembly language runners up in April.

Play—and enjoy! —D.M., Ed. ■ ■ ■



The Winners

• Assembly Language Category

Grand Prize: Roland Knight, Georgetown, Ontario, for "Bugs"

First Runner Up: Roland Boulanger, Ste Julie, Vercheres, Quebec, for "Fly"

Second Runner Up: M.G. Cimbala, Pittsburgh, PA, for "Trap 'Em"

• Basic Category

Grand Prize: A.E. Bogdan, Huntington Woods, MI, for "Spazmorg"

First Runner Up: Jack and Pegi Tindle, Soquel, CA, for "Jackpot Poker"

Second Runner Up: Dave Vinnedge, Moses Lake, WA, for "Whodunit?"

The Finalists

Nic Witschi – **Siege**

Oak Ridge, TN

David Baum – **Miner**

Skokie, IL

Tim Simmons – **20 Million BC**

West Memphis, AK

John Hattan – **Gizmo**

Sherwood, AR

Chris Goulette – **no title**

Fabens, TX

Jeff Darwin – **Spook's Escape!**

Ottawa, Ontario

Lloyd Bozzi – **Protector and Lander**

Glenwood, IL

Jeff Reed – **Black Knight**

Lebanon, TN

D. Reese Warner – **no title**

Houston, TX

Pratik Mukherjee – **First Strike**

Larchmont, NY

Ed Ashton – **Chopper and City War**

Fairmont, WV

Tony Byorick – **Raiders of Rigel**

Biloxi, MS

Wayne Jacobs – **Autobon**

Roanoke, VA

Glen Dahlgren – **Demon Cross**

Pittsburgh, PA

Andrew Nelson – **Get Rich**

Menelham, NJ

Joe Ormsby – **Color Keno**

Sacramento, CA

Steve Seiden – **Quest For The Holy Grail**

Virginia Beach, VA

Sonny Wade – **Cards**

Tuscumbia, AL

Richard Foley – **The Caverns of Makalu**

Wilmington, DE

Kevin Derby – **Hopbopper**

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Roger Smith – **Raid**

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Spectrum Projects	(2) \$50 gift certificates
Sugar Software	Wormtube game#
T & D Software	
TCE Programs	
Tom Mix Software	
Zeta Software	

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2nd Runners-up

Paid publication in The Color Computer Magazine.
Prickley Pear T-Shirt

Machine language winner only
+ Basic winner only

Whodunit

Whodunit is a multi-player mystery game, requiring 32K Extended Basic. Enter the program, save it to tape, and Run it. The game instructions are presented prior to the game, and screen prompts lead the user through required player entries. See page 102.

Jackpot Poker

Jackpot Poker requires 32K Extended Color Basic. Enter the program, save it to tape, and Run it. Expect a short pause, a color test, title page, then menu. Six menu options are presented, including Help and Quit options. Help presents the instructions; Quit ends a game and returns the computer to Basic. The game is played against the computer or against other players. There is a standard poker game (option 1), a timed hand, in which you play for a specified number of minutes (option 2), and a game where you play a specified number of hands (option 3). The fourth option lets you set the amount of money you begin the game with — default value is Zero. Screen prompts guide you in number key selection.

The game uses two short machine language routines to speed up graphics; disk drives must be disconnected during use of this game. If your machine won't take high-speed, (POKE 65495,0), omit that statement from Lines 30, 1120 and 5250. See page 82.

Key Code Summary

Up/Down Arrows	Change Chip Values
1-5 (in menu)	Select Numbers of Chips Bet
Break or M	Return to Menu
Enter	Deal Cards
1-5 (in game)	Hold Cards (Indicated by Position)
Enter	Deal New Cards
Por @	Pause After Winning Hand
Q(enter)	Quit Game



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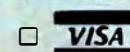
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Jackpot Poker

```

0 : *****
1 : *** JACKPOT POKER ***
2 : *** 8/22/83 ***
3 : *** BY J&P TINDLE ***
4 : *****

10 CLEAR400,32582:P=8:PC=(256*PE
EK(25)+PEEK(26)-1537)/1536:IFP=P
C THENRUN20ELSEPCLEAR8:RUN10
20 POKE&HF8,&H32:POKE&HF9,&H62:P
OKE&HFA,&H1C:POKE&HFB,&HAF:POKE&
HFC,&H7E:POKE&HFD,&HAD:POKE&HFE,
&HA5:POKE&H19A,&H39:POKE&H19B,&H
0:POKE&H19C,&HF8:POKE&H19A,&H7E
30 POKE65495,0:CLS0:PRINT@202,"j
ackpot poker";:PRINT@262,"initia
lization period";:SCREEN0,1:POKE
1233,32:POKE1300,32
40 PMODE4,1:PCLS:DIMBC(62),N(18)
,S(5),NS(13,4),N1(18),X(5),X1(5)
,Y(5),Y1(5),H(5),S$(4),L$(58),D$(
13):GOSUB5000:GOSUB10000:GOTO10
00
50 PMODE3,1:COLOR1,0:PCLS3:IFNU=
1THENPMODE4,1:GOSUB5530:A1=0
60 PMODE4,1:SCREEN1,1:GOSUB5010:
GOSUB5030:GOSUB5110:GOSUB5150:GO
SUB5330:GOSUB5340
70 A$=INKEY$:IFA$=""THEN70
80 SOUND240,1
90 IFA$="M"ORA$=CHR$(3)THENPMODE
3,1:COLOR3:LINE(28,4)-(240,18),P
SET,BF:LINE(10,162)-(58,182),PSE
T,BF:COLOR1,0:GOTO1160
100 IFA$="Q"THEN5200
110 IFA$=CHR$(13)AND NC>0THEN160

120 IFA$=CHR$(8)THEN NC=0:GOSUB5
150:GOTO70
130 IFA$=CHR$(94)THEN CV=CV+5:GO
SUB5110:GOTO70
140 IFA$=CHR$(10)THEN CV=CV-5:GO
SUB5110:GOTO70
150 A=VAL(A$):IFA<1 OR A>5 THEN7
0ELSE NC=A:GOSUB5390:GOTO70
160 A1=1000:FORI=1TO5:H(I)=0:NEX
TI:GOSUB5170:FORI=1TO4:FORI1=1TO
13:NS(I1,I)=1:NEXTI1,I:FORI=1TO5

170 N=RND(13):S=RND(4):IFNS(N,S)
=0THEN170
180 NS(N,S)=0:N(I)=N:S(I)=S:NEXT
I
190 FORI=1TO5:GOSUB5040:ONS(I)GO
SUB5060,5070,5080,5090:GOSUB5100
:NEXTI:A$=INKEY$
200 A$=INKEY$:IFA$=""THEN200

```

```

210 IFA$=CHR$(13)THEN240
220 IFA$=CHR$(8)THEN GOSUB5400:G
OTO200
230 A=VAL(A$):IFA<1 OR A>5 THEN2
0ELSE H(A)=1:GOSUB5410:B=RND(12
):PLAY"T100=A;=B;":GOTO200
240 FORI=1TO5:IFH(I)=0THEN GOSUB
5050:NEXTI ELSE NEXTI
250 FORI=1TO5
260 N=RND(13):S=RND(4):IFNS(N,S)
=0THEN260
270 IFH(I)=0THEN NS(N,S)=0:N(I)=
N:S(I)=S:GOSUB5040:ONS(I)GOSUB50
60,5070,5080,5090:GOSUB5100:NEXT
I ELSE NEXTI
280 A=0:B=0:C=0:F=0:FORI=1TO13:F
ORI1=1TO13
290 IFN(I1)=I THEN B=B+1:N1(B)=I
:N(I1)=0
300 NEXTI1,I:B=0
310 IFS(1)=S(2)ANDS(2)=S(3)ANDS(
3)=S(4)ANDS(4)=S(5)THENF=1
320 IF N1(1)=1 AND N1(2)=10 AND
N1(3)=11 AND N1(4)=12 AND N1(5)=
13THEN5420
330 FORI=N1(1)TO N1(1)+4:B=B+1
340 IF N1(B)=I THEN C=C+1:NEXTI
ELSE NEXTI
350 IFC=5 THEN A=0:B=0:C=0:GOTO5
420
360 IFF=1THEN5460
370 A=0:B=0:C=0:IFN1(1)=N1(4)OR
N1(2)=N1(5)THEN A=5:GOTO450
380 IFN1(1)=N1(3)OR N1(2)=N1(4)O
R N1(3)=N1(5)THEN A=3
390 IFA=3 AND N1(1)=N1(3)AND N1(
4)=N1(5)THEN A=4:GOTO450
400 IFA=3 AND N1(3)=N1(5)AND N1(
1)=N1(2)THEN A=4:GOTO450
410 IFA=3THEN450
420 A=0:FORI=1TO5
430 IFN1(I)=N1(I+1)THENA=A+1
440 NEXTI
450 ON A GOTO 5470,5490,5500,551
0,5520
460 GOSUB5400:GOSUB5300:GOTO5560

1000 PCLS:GOSUB5010:GOSUB5020:PM
ODE4,5:PCLS:PMODE3,5:COLOR3:LINE
(26,25)-(228,167),PSET,B:LINE(28
,25)-(28,167),PSET:PAINT(0,0),4,
3:LINE(4,6)-(250,186),PSET,B:PAI
NT(0,0),3,3:DRAW"BM32,23S2C3XSS(
1);BM96,23XSS(3);":PAINT(32,16),
3,3:PAINT(96,16),3,3

```

♦ more

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1010 FORI=48TO144STEP32:CIRCLE(I
,16),4,2:NEXTI:PMODE4,5:DRAW"BM6
4,23COXX$(2);BM128,23XX$(4)":"PA
INT(64,16),0,0:PAINT(128,16),0,0
:FORI=1TO48:M=USR1(0):NEXTI:FORI
=5TO8:PCOPYI TOI-4:NEXTI
1020 PMODE3,5:DRAW"BM128,112S8XS
$(1)":"PAINT(128,96),3,3:PMODE4,
5:B$="C O L O R T E S T":DRAW"
S4C1BM62,50":GOSUB5190
1030 SCREEN1,1:PLAY"T2002BCDEFG"
:B$="IS THIS HEART RED? (Y/N)":D
RAW"C1BM46,140":GOSUB5190
1040 FORI=1TO25:A$=INKEY$:IFA$="
"THENNEXTI ELSEI=25:NEXTI:GOTO10
60
1050 M=USR1(0):GOTO1040
1060 SOUND240,1:IFA$="Y"THEN1090
ELSEIFA$="N"THENLINE(62,42)-(194
,52),PRESET,BF:LINE(100,64)-(156
,116),PRESET,BF:LINE(46,132)-(21
2,140),PRESET,BF ELSE1040
1070 B$="D O N ' T P A N I C !
!":DRAW"BM40,60C1":GOSUB5190:B$=
"PRESS RESET AND RUN AGAIN":DRA
W"BM40,96C1":GOSUB5190:B$="UNLES
S YOU WANT BLUE":DRAW"BM60,140C1
":GOSUB5190
1080 B$="HEARTS AND DIAMONDS":DR
AW"BM60,156C1":GOSUB5190:FORI=1T
O3000:NEXTI:FORI=1TO4:PCOPYI TOI
+4:NEXTI:GOTO1100
1090 B$="G O O D !":DRAW"BM100,1
60C1":GOSUB5190:FORI=1TO300:NEXT
I:FORI=1TO4:PCOPYI TOI+4:NEXTI:P
LAY"T20GFEDC"
1100 PCOPY2TO3:FORP=2TO3:B$="JAC
KPOT":PMODE1,P=C=P+1:DRAW"BM34,3
4;C=C;S16":GOSUB5190:DRAW"BM36,3
4C=C;":GOSUB5190:B$="POKER":DRAW
"BM62,80C=C;":GOSUB5190:DRAW"BM6
4,80C=C;":GOSUB5190:PCOPY2TO6:NE
XTP
1110 POKE65494,0:PMODE4,5:PLAY"T
13":C$="32323":FORV=14TO2STEP-4:
A=A+1:B=VAL(MID$(C$,A,1)):PCOPYB
TO6:M=USR1(0):FORO=1TO5
1120 PLAY"V=V;O=O;1":M=USR1(0):P
LAY"O5;3":M=USR1(0):PLAY"5":M=US
R1(0):PLAY"1":NEXTO,V:FORV=5TO1S
TEP-1:PLAY"V=V;3;5;1":NEXTV:PLAY
"V15":POKE65495,0:PCOPY2TO6:PCOP
Y7TO3:PMODE4,1:LINE(32,50)-(224,
90),PRESET,BF
1130 B$="M E N U":PMODE1,1:DRAW"
S8BM80,75C3":GOSUB5180:COLOR3:LI
NE(80,80)-(172,80),PSET:PMODE4,1
:B$="1 JACKPOT POKER":DRAW"S4B
M52,52C1":GOSUB5190:B$="2 TIME
D POKER":DRAW"BM52,64C1":GOSUB51
90
1140 B$="3 NUMBER OF HANDS":DR
AW"BM52,76C1":GOSUB5190:B$="4
SET UP CASH":DRAW"BM52,88C1":GOS
UB5190:B$="5 HELP":DRAW"BM52,1
00C1":GOSUB5190:B$="6 QUIT":DR
AW"BM52,112C1":GOSUB5190
1150 PMODE4,5:FORI=1TO20:LINE(32
,50+I)-(224,50+I),PRESET:LINE(32
,90-I)-(224,90-I),PRESET:M=USR1(
0):NEXTI:FORI=1TO4:PCOPYI TOI+4:
NEXTI:B1=1:SOUND240,1
1160 A=0:T=0:T1=0:NU=0:B2=1:A$=I
NKEY$:PMODE4,5:SCREEN1,1:B$="SEL
ECT OPTION":DRAW"BM52,126C1":GOS
UB5190:POKE279,PEEK(275)
1170 FORI=1TO25:A$=INKEY$:IFA$="
"THENNEXTI ELSEI=25:NEXTI:GOTO11
90
1180 M=USR1(0):GOTO1170
1190 IFA$=CHR$(3)THENCLS0:POKE65
494,0:STOP
1200 SOUND240,1:IFVAL(A$)<1ORVAL
(A$)>6THEN1160ELSELINE(158,118)-
(166,128),PRESET,BF:B$=A$:DRAW"B
M158,126C1":GOSUB5190
1210 IFA$="1"ANDB1=1THENB1=0:LIN
E(50,114)-(225,128),PRESET,BF:GO
TO50ELSEIFA$="1"THENLINE(50,114)-
(225,128),PRESET,BF:PMODE4,1:SC
REEN1,1:GOTO70
1220 A=VAL(A$)-1:ON A GOTO1230,1
330,1420,1520,1590
1230 T=1:T1=0:T3=0:T$=""":B$="ENT
ER TIME LIMIT IN MINUTES":DRAW"B
M31,138C1":GOSUB5190:B$="( 60 MI
N. MAXIMUM)":DRAW"BM31,150C1":G
OSUB5190:DRAW"BM178,150C1":A$=IN
KEY$
1240 FORI=1TO25:A$=INKEY$:IFA$="
"THENNEXTI ELSEI=25:NEXTI:GOTO12
60
1250 M=USR1(0):GOTO1240
1260 IFA$=CHR$(13)ANDT1>60THENPL
AY"T1001C":B$="ERROR - PLEASE TR
Y AGAIN":DRAW"BM31,162C1":GOSUB5
190:FORI=1TO500:NEXTI:LINE(31,15
4)-(220,164),PRESET,BF:A$=CHR$(8
):GOTO1280ELSE SOUND240,1
1270 IFA$=CHR$(13)ANDT1>0THENLIN
E(31,114)-(225,165),PRESET,BF:GO
TO1320ELSEIFA$=CHR$(13)THENB$="T
HAT WAS A QUICK GAME!":DRAW"BM31
,162C1":GOSUB5190:FORI=1TO500:NE

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XTI:LINE(31,114)-(225,165),PRESET,BF:GOTO1160
1280 IFA$=CHR$(8)THENLINE(176,140)-(196,152),PRESET,BF:DRAW"BM17
8,150C1":T1=0:T$=""GOTO1240
1290 IFASC(A$)<48ORASC(A$)>57THE
N1240
1300 IFLEN(T$)=2THEN1240
1310 B$=A$:DRAW"C1":GOSUB5190:T$=T$+A$:T1=VAL(T$):GOTO1240
1320 IFB1=1THENB1=0:TIMER=0:GOTO
50ELSEPMODE4,1:SCREEN1,1:TIMER=0
:GOTO70
1330 NH=0:NU=0:T=0:N$=""B$="ENTER NUMBER OF HANDS TO BE":DRAW"B
M31,138C1":GOSUB5190:B$="DEALT (999 HANDS MAX.)":DRAW"BM31,150
C1":GOSUB5190:DRAW"BM52,162C1":A$=INKEY$
1340 FORI=1TO25:A$=INKEY$:IFA$=""
"THENNEXTI ELSEI=25:NEXTI:GOTO13
60
1350 M=USR1(0):GOTO1340
1360 SOUND240,1
1370 IFA$=CHR$(13)ANDNH>0THENNU=1:GOTO1410ELSEIFA$=CHR$(13)THENL
INE(50,152)-(75,164),PRESET,BF:B$="ZERO EH? GAME OVER!":DRAW"BM
31,162C1":GOSUB5190:FORI=1TO500:
NEXTI:LINE(31,114)-(225,165),PRE
SET,BF:NU=0:N$="":GOTO1160
1380 IFA$=CHR$(8)THENLINE(50,152)
-(75,164),PRESET,BF:DRAW"BM52,1
62C1":NH=0:N$="":GOTO1340
1390 IFLEN(N$)=3THEN1340
1400 IFASC(A$)<48ORASC(A$)>57THE
N1340ELSEB$=A$:DRAW"C1":GOSUB519
0:N$=N$+A$:NH=VAL(N$):GOTO1340
1410 A1=1000:LINE(31,114)-(225,1
65),PRESET,BF:IFB1=1THENB1=0:GOT
O50ELSEPMODE4,1:GOSUB5530:A1=0:S
CREEN1,1:GOTO70
1420 B$="HOW MUCH WILL YOU START
WITH":DRAW"BM31,138C1":GOSUB519
0:B$="( 1000 DOLLARS MAX. ) ?":D
RAW"BM31,150C1":GOSUB5190
1430 SC=0:SC$=""DRAW"BM52,162C1
":A$=INKEY$
1440 FORI=1TO25:A$=INKEY$:IFA$=""
"THENNEXTI ELSEI=25:NEXTI:GOTO14
60
1450 M=USR1(0):GOTO1440
1460 SOUND240,1:IFA$=CHR$(13)AND
SC>1THENB$="DOLLARS! GOOD LUCK!
":DRAW"BM87,162C1":GOSUB5190:GOT
O1510
1470 IFA$=CHR$(13)THENLINE(50,15

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2)-(84,164),PRESET,BF:B$="GOOD L
UCK, YOU'LL NEED IT!":DRAW"BM31,
162C1":GOSUB5190:GOTO1510
1480 IFA$=CHR$(8)THENLINE(50,152)
)-(84,164),PRESET,BF:GOTO1430
1490 IFLEN(SC$)=4THEN1440
1500 IFASC(A$)<48ORASC(A$)>57THE
N1440ELSEB$=A$:DRAW"C1":GOSUB519
0:SC$=SC$+A$:SC=VAL(SC$):IFSC>10
0OTHENSC=1000:GOTO1440ELSE1440
1510 FORI=1TO500:NEXTI:IFB1=0THE
NPMODE4,1:GOSUB5340:PMODE4,5:LIN
E(31,114)-(225,165),PRESET,BF:GO
TO1160ELSELINE(31,114)-(225,165)
,PRESET,BF:GOTO1160
1520 LINE(50,114)-(225,128),PRES
ET,BF:B$="A PAIR OF JACKS OR BET
TER":DRAW"BM31,124C1":GOSUB5190:
B$="WINS! UP AND DOWN ARROWS":DR
AW"BM31,134C1":GOSUB5190:B$="CHA
NGE CHIP VALUE (1-5-10)":DRAW"B
M31,144C1":GOSUB5190
1530 B$="USE 1-5 TO HOLD ANY CAR
D AND":DRAW"BM31,154C1":GOSUB519
0:B$="TO ENTER NUMBER OF CHIPS B
ET":DRAW"BM31,164C1":GOSUB5190
1540 FORI=1TO4000:IFINKEY$<>""TH
ENI=4000:SOUND240,1:NEXTI ELSE
NTI
1550 LINE(31,114)-(225,165),PRES
ET,BF:B$="PRESS < ENTER > TO PLA
CE":DRAW"BM31,124C1":GOSUB5190:B
$="YOUR BET OR DRAW NEW CARDS.":D
RAW"BM31,134C1":GOSUB5190:B$="U
SE LEFT ARROW TO ERASE."
1560 DRAW"BM31,144C1":GOSUB5190:
B$="PRESS < M > FOR MENU.":DRAW"
BM31,154C1":GOSUB5190:B$="PRESS
ANY KEY TO CONTINUE.":DRAW"BM31,
164C1":GOSUB5190:A$=INKEY$
1570 FORI=1TO4000:IFINKEY$<>""TH
ENI=4000:SOUND240,1:NEXTI ELSE
NTI
1580 LINE(31,114)-(225,165),PRES
ET,BF:A$=INKEY$:GOTO1160
1590 PMODE4,5:SCREEN1,1:LINE(32,
30)-(225,165),PRESET,BF:B$="JACK
POT POKER":DRAW"BM82,80C1":GOSUB
5190:B$="BY":DRAW"BM120,92C1":GO
SUB5190:B$="JACK & PEGI":DRAW"BM
88,104C1":GOSUB5190
1600 B$="TINDLE":DRAW"BM106,116C
1":GOSUB5190
1610 FORI=1TO500:IFINKEY$<>""THE
NI=500:NEXTI ELSENEXTI
1620 FORI=32TO164:LINE(32,I)-(22

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more

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5,I),PRESET:M=USR1(0):NEXTI:CLS0
:SOUND240,1:POKE65494,126:END
5000 FORI=1TO15STEP2.3:CIRCLE(33
,48),I,,7:NEXTI:CIRCLE(33,48),3,
0,2.4:PAINT(33,48),0,0:GET(16,21
)-(52,77),BC,G:RETURN
5010 LINE(10,114)-(58,137),PRESE
T,BF:LINE(0,0)-(255,191),PRESET,
B:LINE(1,1)-(254,190),PRESET,B:Y
=20:Y1=80:FORX=12TO204STEP48:LIN
E(X,Y)-(X+40,Y1),PSET,BF:LINE(X,
Y)-(X+40,Y1),PRESET,B:NEXTX:RETU
RN
5020 Y=22:FORX=14TO206STEP48:PUT
(X,Y)-(X+36,Y+56),BC,PSET:NEXTX:
GET(12,20)-(52,80),BC,G:RETURN
5030 Y=20:Y1=80:FORX=12TO204STEP
48:PUT(X,Y)-(X+40,Y+60),BC,PSET:
NEXTX:RETURN
5040 LINE(X2(I),20)-(X3(I),80),P
SET,BF:LINE(X2(I),20)-(X3(I),80)
,PRESET,B:RETURN
5050 PUT(X2(I),20)-(X3(I),80),BC
,PSET:RETURN
5060 PMODE3,1:DRAW"BM"+STR$(X1(I
)-1)+",,=Y1(I);X$$(1);":PAINT(X1(
I),Y1(I)-12),3,3:PMODE4,1:RETURN
5070 DRAW"BM=X1(I),,=Y1(I);X$$(2
);":PAINT(X1(I),Y1(I)-2),0,0:PAI
NT(X1(I),Y1(I)-12),0,0:RETURN
5080 PMODE3,1:DRAW"BM"+STR$(X1(I
)-1)+",,=Y1(I);X$$(3);":PAINT(X1(
I),Y1(I)-12),3,3:PMODE4,1:RETURN
5090 DRAW"BM=X1(I),,=Y1(I);X$$(4
);":PAINT(X1(I),Y1(I)-2),0,0:PAI
NT(X1(I),Y1(I)-12),0,0:RETURN
5100 IFN(I)=10THENDRAW"C0BM=X(I)
,=Y(I);":DRAW"BM-2,0XD$(N(I));"
:DRAW"BD46BR6XD$(N(I));C1":RETUR
NELSEDRAW"C0BM=X(I),,=Y(I);XD$(N
(I)),":DRAW"BD46BR17XD$(N(I));C1
":RETURN
5110 IF CV=<1 THEN CV=1
5120 IF CV=>10 THEN CV=10
5130 IFCV>1 AND CV<10 THEN CV=5
5140 PMODE3,1:COLOR4:LINE(14,117
)-(54,134),PSET,BF:DRAW"BM16,132
C1S8XL$(4);BM16,132":B$=STR$(CV)
:GOSUB5180:DRAW"S4":PMODE4,1:COL
OR1,0:RETURN
5150 PMODE3,1:COLOR3:LINE(76,115
)-(222,126),PSET,BF:PMODE4,1:COL
OR1,0:B$="PLACE YOUR BET":LINE(7
6,115)-(180,126),PSET,BF:LINE(76
,115)-(180,126),PRESET,B:LINE(19
0,115)-(202,126),PSET,BF:LINE(19
0,115)-(202,126),PRESET,B:DRAW"B
M81,124C0"
5160 FORI=1TOLEN(B$):DRAWL$(ASC(
MID$(B$,I,1))-32):NEXTI:COLOR1,0
:PLAY"O5T200BBBBP1BBBBP1BBBB":IFNC
>0THENAS$=RIGHT$(STR$(NC),1):GOSU
B5390:RETURNELSERETURN
5170 YB=NC*CV:PMODE3,1:COLOR3:LI
NE(76,115)-(222,126),PSET,BF:PMO
DE4,1:COLOR1,0:LINE(84,115)-(166
,126),PSET,BF:LINE(84,115)-(166,
126),PRESET,B:B$="YOU BET $":DRA
W"BM88,124C0":GOSUB5180:B$=STR$(
YB):DRAW"BM144,124C0":GOSUB5180:
SC=SC-YB:GOSUB5340:RETURN
5180 FORI=1TOLEN(B$):DRAWL$(ASC(
MID$(B$,I,1))-32):NEXTI:COLOR1,0
:RETURN
5190 FORI=1TOLEN(B$):DRAWL$(ASC(
MID$(B$,I,1))-32):DRAW"BL6":DRAW
L$(ASC(MID$(B$,I,1))-32):DRAW"BL
":NEXTI:COLOR1,0:RETURN
5200 PMODE3,1:COLOR3:LINE(190,11
5)-(222,126),PSET,BF:PMODE4,1:CO
LOR1,0:LINE(190,115)-(222,126),P
SET,BF:LINE(190,115)-(222,126),P
RESET,B:DRAW"BM194,124C0XQ$":CO
LOR1,0
5210 A$=INKEY$:IFA$=""THEN5210
5220 IFA$=CHR$(13)THEN1590
5230 GOSUB5150:GOTO70
5240 LINE(84,132)-(188,143),PSET
,BF:LINE(84,132)-(188,143),PRESE
T,B:B$="YOU WIN $":DRAW"BM88,141
C0":GOSUB5180:B$=STR$(W):DRAW"BM
144,141C0":GOSUB5180:IFT=1 ORA2=
1THEN5260
5250 POKE32749,8:POKE32750,128:P
OKE32758,16:POKE32759,32:POKE327
54,RND(3)*85:POKE65494,0:FORV=26
TO3STEP-1:A=RND(12):O=RND(5):PLA
Y"T220=0;V=V;=A;V15":M=USR(0):NE
XTV:POKE65495,0:POKE32749,6:POKE
32750,0:POKE32758,30:POKE32759,0
5260 FORI=1TO1000:A$=INKEY$:IFA$=
"@":ORA$="P":THENI=1000:NEXTI:GOT
O5270ELSEIFA$<>"":THENI=1000:NEXT
I:GOTO5290ELSENEXTI:GOTO5290
5270 LINE(84,148)-(124,159),PSET
,BF:LINE(84,148)-(124,159),PRESE
T,B:B$="PAUSE":DRAW"BM88,157C0":
GOSUB5180:P=TIMER:A$=INKEY$
5280 A$=INKEY$:IFA$=""THEN5280EL
SEPMODE3,1:COLOR3:LINE(84,148)-(1
24,159),PSET,BF:PMODE4,1:COLOR1
,0:TIMER=P

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Playin' Around

*An interview with one of the foremost
Color Computer game writers.*

I recently heard several people talking happily to Steve Bjork, their favorite Color Computer programmer. Each person had a question about Steve's life, his programs and his employer (Datasoft). Steve didn't have time, then, to answer very many questions. This interview should answer those questions, and many more.



by John Jermaine

This interview was given and approved for publication by Steve Bjork — Author

LACCUG is now Color America Users Group.



"My early machine language programming was archaic."

Q. Steve, thanks for finding time on your last day at Datasoft to do this interview. Would you start by giving me some background on yourself?

A. I haven't been in computers all my life, but January, 1983, was my ten year anniversary. I'm currently twenty-five years old and was a magician, salesman and amusement park ride operator before I became a programmer for Datasoft. In high school I started programming in Basic and Fortran, and acquired my first computer (a TRS-80 Model I) in 1977, one of the first in the San Fernando Valley, where I grew up. I attended a local junior college and the University of San Diego, where I became involved in the Pascal Project. Eventually my love for pinball machines led me to video games, and learning how their programming operates.

Q. What were your early goals? How have they changed?

A. In the early days I wanted to get something going in my life to make a lot of money. Now I'm more realistic. I will make some money in computer games, but games won't be around forever. Currently, I'm going back to school to take courses in robotics and its industrial applications, so I will always have a job.

Q. What was your earliest machine language programming like? Did anything come of it?

A. My early machine language programming was archaic. I dread even looking back on "Popcorn" and "Clowns and Balloons." My first machine language concept, "Space Ball," was successful, but the game wasn't. Envision a paddle at the bottom of the screen with a rocket above the paddle and weird aliens walking back and forth across the top of the screen. The paddle hits the rocket and the rocket hits and destroys the aliens. This concept was preserved in "Clowns and Balloons," but "Space Ball" was never sold.

Q. What is your philosophy on programming?

A. My philosophy is: get some schooling, experiment, experiment, play with

your computer at home, use your computer as much as possible, and don't get bored or discouraged. If you have a graphics problem and you find a game that solves your problem, disassemble it and find out what makes it work. Be daring in your experimentation. Many interesting things have been discovered by accident!

Q. What are your favorite arcade and Color Computer games, and why?

A. In the arcade I enjoy "Tron," because it's four games in one. I also enjoy Atari's "Black Widow" game, and "Robotron." On the Color Computer, I feel my favorite game will be "Pooyan," because it's a cute game. The Intracolor programmer who did "Robottack" did an excellent job, also!

Q. Why do you think there are no Atari programs adapted for the Color Computer?

A. I think Atari's advertisement — "Only on Atari" — says it all.

Q. Before we discuss "Zaxxon," what are your favorite things, besides the Color Computer?

A. I thoroughly enjoy the beaches and amusement parks of Southern California. My only other weakness is anything high tech, ranging from my wide-screen T.V. to my video equipment and laser disc machine.

Q. Tell me about "Zaxxon."

A. As far as I know, "Zaxxon" was the first licensed arcade game for the Color Computer, with Cornsoft's "Frogger" running a close second. I have to hand it to the president of DataSoft. He literally took "Zaxxon" out of the mouths of larger companies, and acquired the licenses for other games, including "Moon Shuttle" and "Pooyan."

Q. How was "Zaxxon" developed? What are the versions of "Zaxxon" on other computers like?

A. My first goal was to make a game as playable as the arcade version, using the limitations of the Color Computer! You must realize the arcade version has two graphics systems, with over 960K of

ROM. The Color Computer has a single graphics system and 32K of memory! I also had to deal with Sega. Sega licensed "Zaxxon" to Datasoft, with the contract stating that Sega had final say as to the version of "Zaxxon" to be released. There were some small changes made to my original concept; I am very surprised Sega let me get away with the explosions used in blowing up the robot and the player's ship. The sound could have been closer to the arcade version.

Originally, "Zaxxon" was to have been a 16/32K package in cassette and disk versions. The 16K "Zaxxon" wouldn't have had all the fine graphic detail of the 32K version. It would have been a little coarser, but the game would still play. The 32K version was planned to be the version in current release.

Other computer versions of "Zaxxon" are very interesting. The Apple version is excellent, with a bit more detail than mine, but it's disk only and took seven months to program. The Atari version is sold in 16K and 32K versions. The background graphics are more detailed than mine, but the ship doesn't fly very smoothly!

Q. Are there any secrets to playing "Zaxxon"?

A. Fire a lot: anything your shots hit, you're going to hit. When going through the second fortress sequence, squeeze through the force field openings by using the gauge on the left side of the screen to estimate height, or fire shots at the force field. These shots will splat against the point where you'll meet the force field.

Q. Is there a possibility of an up-dated "Zaxxon"?

A. There's always a possibility, but I don't think you'll see it. Once a company develops and markets a program, they very rarely update it. Companies would rather spend time and money on a new program that hasn't been marketed than to update a program that has hit the market. Personally, I'd like to program a version of "Zaxxon" with more memory, or for a future system with capabilities

beyond the present Color Computer.

Q. What is your opinion of "Zaksund"? What did you think of the recent review that said "Zaksund" and "Zaxxon" were very similar?

A. I feel that the company selling "Zaksund" is probably going to have financial difficulties pretty soon, due to legal problems. The game "Zaksund" has a little better sound than "Zaxxon," but the sound stops the game's motion. I've found ways to generate sound effects (such as the explosions in "Zaxxon") with the graphics not paying for them. The "Zaxxon — Zaksund" reviewer couldn't have looked at either game seriously, or he knows nothing about video games and he mainly reviews word processors. Anyway, I feel he could have spent more time on that review.

Q. What are the stages of program development?

A. First you need a concept, a general plan, whether it comes from outside sources or was developed in the company. Then you refine the concept. The programmer begins writing the code for the program, while the artist and the programmer put their materials together, fine tuning and polishing the program. Any special packaging, and programming additions and subtractions, are also taken into account before the project's completion.

Q. Tell me about your programming tools.

A. I generally use a modified version of "Micro Painter" as my drawing and graphics tool, because it generates a picture that can be used in Basic programming. I also use a modified version of the ROM-pak EDTASM program and other programs that let me grab the "Micro Painter" images and generate data tables for EDTASM.

Q. Explain "program compression." What is "graphic compression"?

A. Program compression isn't much: write tighter and tighter code, and use tables where possible to save time! Now, graphic compression is a different subject. Though I can't go into much detail, there are two types of graphic compression. The first type was developed before "Canyon Climber." It lets me take the 18K of screens in "Canyon Climber" and compress it down to 1800 bytes, including the decompression routine that generated the screen. This method was later greatly improved upon. The new graphic compression technique lets me take 24K of screens from a game like "Poo-yan" and compress them down to less than 1200 bytes, including decompression.

Q. If I wanted to sell software, what tips would you pass along?

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S K I L L W A R E



"My favorite programmer is—me!"

A. First of all, don't try to undercut everybody — you'll only hurt yourself! One individual undercut everyone by selling "Zaxxon" for thirty-two dollars. The guy sold a lot of copies, but he didn't make much, because one person decided to undercut his competition! Finally, don't try stocking all software that looks and sounds good. Wait for orders to come in, and order what you need. Be aware of the Federal law that requires dealers to ship software orders so many days after the post mark on the order.

Q. Do you plan to work on any graphic adventure programs now that you are leaving Datasoft?

A. No comment!

Q. What are you working on now?

A. Program wise, no comment. I am currently developing special sound and graphic routines, new animation routines, and routines that produce highly-detailed graphics. The best part about these new routines is that they use very little memory.

Q. I recently saw *Return of the Jedi*, and noticed one scene which contained 60 independently moving objects. Could a game for the Color Computer have that many independently moving objects?

A. To do that I think we're looking at a system that requires specialized character graphics. With so many objects moving, if they need to move quickly, they're going to have to move in one big jump! Now, "Pooyan" has about 30 moving objects on the screen at one time, which is the maximum for the present Color Computer. Everything moves very smoothly in "Pooyan" and looks very good. Gerry Humphrey and James Garon teamed up to produce "Pooyan" and the soon to be released "Moon Shuttle."

Q. Tell me about James Garon and his role as musician for Datasoft games.

A. James does all our music. James takes each individual game and writes special music to fit that program. As in the case of "Pooyan," James listened to the music of the arcade game at Datasoft. He wrote the musical notes down,

and converted them to musical language the Color Computer understands. James is also a good programmer, which hasn't been talked about yet!

Q. I understand you worked with James on "The Sands of Egypt." Can you tell me about "The Sands of Egypt," and upcoming projects at Datasoft?

A. "The Sands of Egypt" was the most costly project Datasoft has developed, with the exception of "Zaxxon." "The Sands of Egypt" was the first attempt by Datasoft to do an Adventure, because they usually don't sell as well as arcade type games. The main reason Adventures don't sell well is that Adventures are more intelligence-oriented.

Arcade games also sell better because of impulse buying, the graphics, clever sounds and eye-catching title screens. "The Sands of Egypt" is a mixture of the graphics of an arcade game and the challenge of an Adventure.

Ralph Burris, James and myself completed "The Sands of Egypt" after five months of work. The completed game took up about 50K of disk space with very little compression. I can see the day coming when we could take a program like that, redraw the pictures, use new conversion tables, and put that program on a ROMpak. My final comment on "The Sands of Egypt" is it could have been a little better.

Datasoft has recently licensed a new graphic adventure game based on the *Dallas* television program. I'm very interested in how this project turns out.

Q. I've heard that every company has programs in its vaults that are unreleased. Does Datasoft have any Color Computer programs in their vaults?

A. Datasoft has one older game in its vault, which was a team project between James Garon and myself, and was written in seven working days. The game was a "between projects" trial of some new graphic ideas which were used in several other games. I don't feel it was any great loss to the public.

Q. Do you keep close contact with other programmers? Who is your favorite?

A. I try as much as possible to keep contact, but a lot of other programmers are very tight-lipped about what they do. I'm tight-lipped about graphic routines developed for "Zaxxon" because I spent about seven months developing them. Techniques and routines used in earlier programs, like "Clowns and Balloons," I give out. The earlier games had a lot of ability in them, but they didn't have the sophisticated graphics of "Zaxxon." My favorite programmer is — me!

Q. Let's talk about games in competition with your games. What is your opinion of "Grabber," "Moon Hopper" and "The King"?

A. I recently saw "Grabber," and I take my hat off to the programmer. I believe we may start seeing duel-screen games along the lines of "Grabber," and multiple-screen games like "Canyon Climber" in the near future. "Moon Hopper" is not bad, but it could have been taken a lot further. I don't like the ladder-climbing games like "The King" and "Canyon Climber," which is why I won't comment on "The King." I never got into Pac Man-type games, which is why I can't stand to play my own "Megabug."

Q. Do you know why "Canyon Climber" didn't have a fourth screen?

A. We were dealing with 6K screens in "Canyon Climber." Three screens by 6K per screen equals 18K. We only had an 8K ROMpak with which to work. We found a way to compress 18K of data and still leave enough room for the program, but it took every byte of the 8K available to us.

Q. Do you feel the first 64K game is close to hitting the Color Computer market?

A. I feel, at this time, there aren't enough 64K Color Computers to warrant such a program. Things could change drastically in two or three months, and I might consider writing a 64K game myself.

Q. Let's talk about Computer Clubs. You are active in your local club, the Los Angeles area Color Computer club. Mark

Randall, the president of the L.A. Color Computer Users Group (LACCUG) tells me that you and the users group planned a fall convention for the Color Computer with **The Color Computer Magazine**. Please comment.

A. At present, I am active in local computer clubs, including the L.A. Color Computer Users Group. The L.A. Club is one of the largest meeting Color Computer groups anywhere! The users group and I feel there should be more conventions for the Color Computer, and we put together one for southern California this fall (1983). Personally, I'm glad a users group will help sponsor this event, because the only benefit they get, as a non-profit organization, is more users.

Q. Mark Randall also tells us you have been "invaluable" because you are willing to teach others about your advanced programming techniques. Tell us more.

A. We say at the L.A.C.C.U.G. that a users group is the best peripheral you can get for your computer. I'm not an officer, but I do run one of the SIGs (Special Interest Groups), called the PlaySIG. It's dedicated to the recreational side of the Color Computer. Right now we are working on a machine language arcade game that will be sold as fund raiser for the group. Members of the club are learning about programming by actually doing it. Other members who may not be as interested in programming are helping by donating their creative, artistic and musical skills to the project. It's exciting to see so many different people discovering and improving talents they didn't know they had.

Q. Can you tell us more about the game?

A. Not at this time, because a large corporation that likes to keep its projects secret is very interested in marketing the game, and I don't want to strain the negotiations at this point. However, I will say that this game could be the biggest blockbuster ever for the Color Computer, and all the users group members who are working on it are very excited.

Q. Steve, this interview has been lots of fun. Would you care to make some final comments?

A. I'm going to relax a little this summer. I plan to write a few games, and improve upon graphic and sound routines. I most look forward to going to the beaches during the week, while you poor slobs work.

Over the years, Steve got where he is through his education, dedication and continuing experimentation. Steve, you jokingly said you were your favorite programmer; I seriously say, "Steve, you are my favorite programmer!" ■■■

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5290 PMODE3:COLOR3:LINE(84,132)-(188,143),PSET,BF:PMODE4:COLOR1,0:RETURN
5300 LINE(84,132)-(174,143),PSET,BF:LINE(84,132)-(174,143),PRESET,B:B$="YOU LOSE $":DRAW"BM88,141C0":GOSUB5180:B$=STR$(YB):DRAW"BM152,141C0":GOSUB5180
5310 FORI=1TO400:IF INKEY$<>" "THEN I=400:NEXTI ELSE NEXTI
5320 PMODE3,1:COLOR3:LINE(84,132)-(174,143),PSET,BF:PMODE4,1:COLOR1,0:RETURN
5330 LINE(76,164)-(192,180),PSET,BF:LINE(72,162)-(196,182),PRESSET,B:RETURN
5340 LINE(76,164)-(192,180),PRESSET,BF:IF SC<0 THEN 5370
5350 IFSC=>100000000THENSC=0
5360 PMODE3,1:COLOR3:DRAW"BM78,178S8XL$(4);BM78,178":B$=STR$(SC):GOSUB5180:DRAW"S4":PMODE4,1:COLOR1,0:RETURN
5370 IFSC=<-9999999THENSC=0
5380 PMODE3,1:COLOR3:DRAW"BM78,178S8XL$(13);XL$(4);BM106,178":B$=STR$(SC):FORI=2TOLEN(B$):DRAWL$(ASC(MID$(B$,I,1))-32):NEXTI:DRAW"S4":PMODE4,1:COLOR1,0:RETURN
5390 LINE(191,116)-(201,125),PSET,BF:DRAW"BM194,124C0"+L$(ASC(A$)-32):COLOR1,0:RETURN
5400 FORI=1TO5:H(I)=0:NEXTI:PMODE3,1:COLOR3:LINE(X2(1),88)-(X3(5),100),PSET,BF:PMODE4,1:COLOR1,0:RETURN
5410 LINE(X2(A),88)-(X3(A),100),PSET,BF:LINE(X2(A)+1,89)-(X3(A)-1,99),PRESET,B:LINE(X2(A),88)-(X3(A),100),PRESET,B:DRAW"C0BM"+STR$(X2(A)+8)+"97XH$":COLOR1,0:RETURN
5420 IFF=1 AND N1(1)=1 AND NC=5THEN W=NC*CV*250*B2:F=0:SC=SC+W:GOSUB5400:GOSUB5340:B$="ROYAL FLUSH":DRAW"BM52,98":GOSUB5550:GOSUB5240:GOTO5560
5430 IFF=1 AND N1(1)=1 THEN W=NC*CV*200*B2:F=0:SC=SC+W:GOSUB5400:GOSUB5340:B$="ROYAL FLUSH":DRAW"BM52,98":GOSUB5550:GOSUB5240:GOTO5560
5440 IFF=1 THEN W=NC*CV*50*B2:SC=SC+W:F=0:GOSUB5400:GOSUB5340:B$="STRAIGHT FLUSH":DRAW"BM30,98":GOSUB5550:GOSUB5240:GOTO5560
```

```
5450 W=NC*CV*6*B2:SC=SC+W:GOSUB5400:GOSUB5340:B$="STRAIGHT":DRAW"BM72,98":GOSUB5550:GOSUB5240:GOTO5560
5460 W=NC*CV*8*B2:SC=SC+W:F=0:GOSUB5400:GOSUB5340:B$="FLUSH":DRAW"BM94,98":GOSUB5550:GOSUB5240:GOTO5560
5470 A=0:FORI=1TO5:IFN1(I)=N1(I+1)THENA=N1(I):NEXTI ELSENEXTI
5480 IFA=1ORA>10THENW=NC*CV*B2:SC=SC+W:GOSUB5400:GOSUB5340:B$="ONE PAIR":DRAW"BM72,98":GOSUB5550:A2=1:GOSUB5240:A2=0:GOTO5560ELS460
5490 W=NC*CV*2*B2:SC=SC+W:GOSUB5400:GOSUB5340:B$="2 PAIR":DRAW"BM86,98":GOSUB5550:GOSUB5240:GOTO5560
5500 W=NC*CV*4*B2:SC=SC+W:GOSUB5400:GOSUB5340:B$="THREE OF A KIND":DRAW"BM24,98":GOSUB5550:GOSUB5240:GOTO5560
5510 W=NC*CV*10*B2:SC=SC+W:GOSUB5400:GOSUB5340:B$="FULL HOUSE":DRAW"BM60,98":GOSUB5550:GOSUB5240:GOTO5560
5520 W=NC*CV*25*B2:SC=SC+W:GOSUB5400:GOSUB5340:B$="FOUR OF A KIND":DRAW"BM30,98":GOSUB5550:GOSUB5240:GOTO5560
5530 IFNH=0THENPMODE3,1:COLOR3:LINE(10,162)-(58,182),PSET,BF:PMODE4,1:COLOR1,0:LH=1:RETURNELSELINE(10,162)-(58,182),PRESET,B:LINE(11,163)-(57,181),PRESET,B:PMODE3,1:COLOR3:LINE(12,164)-(56,180),PSET,BF:B$=STR$(NH):B$=RIGHT$(B$,3):DRAW"BM16,178S8":LH=0
5540 COLOR4:GOSUB5180:PMODE4,1:DRAW"S4":NRH=NH-1:A1=1000:RETURN
5550 PMODE3,1:COLOR4:DRAW"S8":GOSUB5190:PMODE4,1:DRAW"S4":RETURN
5560 PMODE3,1:COLOR3:LINE(28,4)-(240,18),PSET,BF:LINE(10,82)-(246,100),PSET,BF:PMODE4,1:COLOR1,0:B2=1:IFT=1THEN T2=INT(TIMER/60):IFT2=>60THEN T3=T3+1:TIMER=0:IFT3=>T1 THEN 5600
5570 IFNU=1 AND A1=1000THEN GOSUB530:A1=0:IF LH=1 THEN 5600
5580 GOSUB5030:GOSUB5150:IF RND(10)<3THEN B2=2:B$="DOUBLE JACKPOT":DRAW"BM34,16S8":PMODE3,1:COLOR4:GOSUB5190:PMODE4,1:DRAW"S4":GOT0ELSE IF RND(10)<3THEN B2=3:B$="T
```

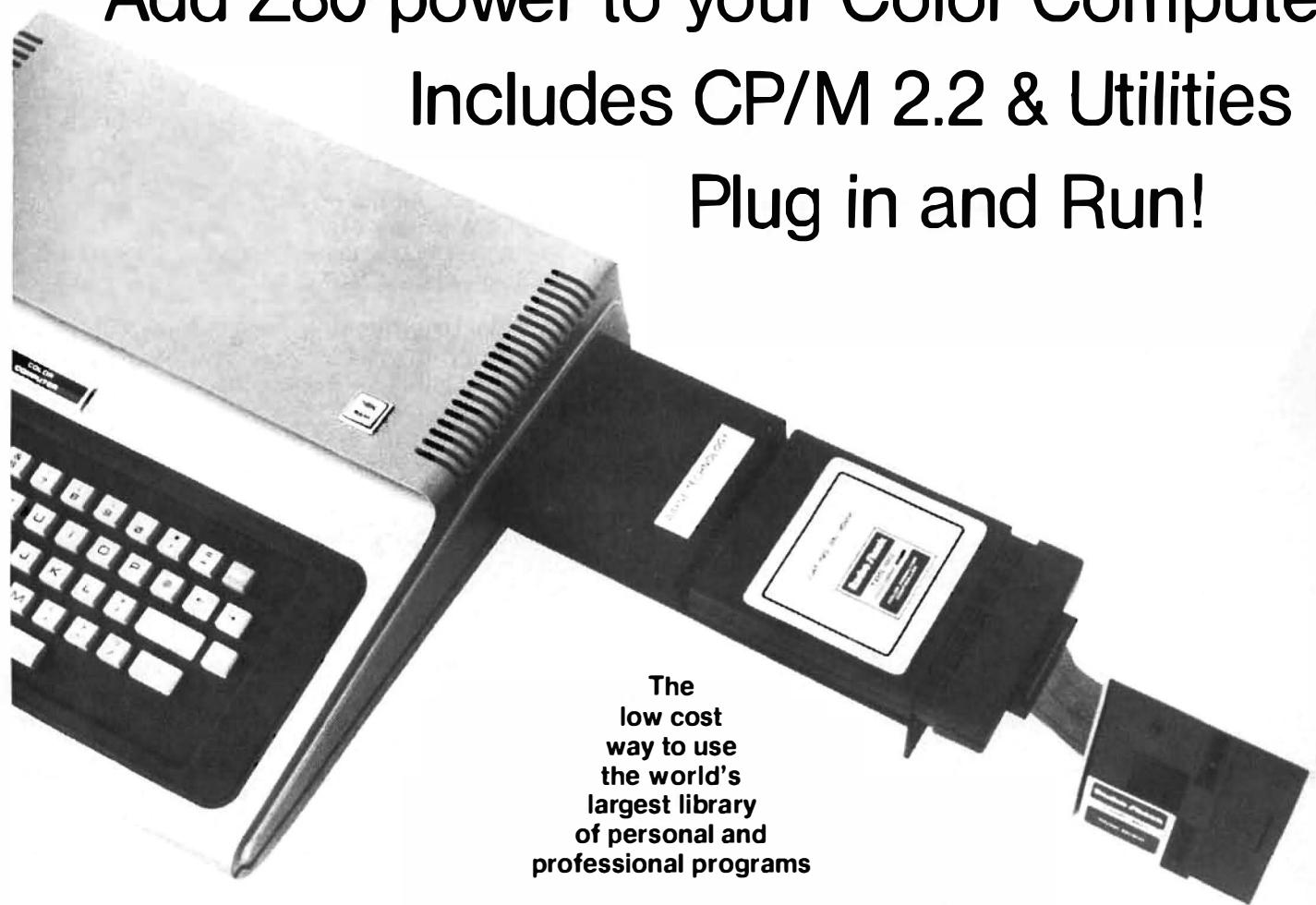
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Disk Secrets

A primer on disks and disk operating systems for beginners.



photo by Charley Freiberg

REMEMBER THE MODEL I? There was a real programmer's machine! We weren't spoon-fed information from reference manuals illustrated with Color Computers with legs and silly grins. We had to dig for it!

Times have changed (sigh...). Gone are the days of wooden men and iron computers. Now all the information (or at least most of it) is present in the Radio Shack manuals. What's more, it's largely correct!

A good case in point is the *Color Computer Disk System Manual*. It's almost

by William Barden, Jr.

unheard of for Radio Shack to be so forthright in their presentation of information about disk operations. In spite of the manual, however, you might be confused by exactly how to use some of the disk functions. So, using the disk system manual as a base, let's discuss disk structure and philosophy. I'll show you how to use the DSKIS command to construct a

disk sector dump and a disk directory/map program. If there's enough interest in disk operations, I'll discuss other disk operations in future articles.

That 45-RPM Record Analogy Again!

Actually, a disk is not like a 45-rpm record of "Tangerine Dream." Oh sure, the inventor of the floppy disk really did make his prototype of the first disk using magnetic material glued to a 45-rpm

♦ more

record, but disk operation is not like a record player's operation. A record is generally played *sequentially*, along a closely packed spiral of a single long groove. Disks are *random access* devices — any spot on the disk can be located rapidly, usually in a fraction of a second.

Disk operation is not mechanically complicated (see Figure 1). The disk spins at about 300 revolutions per minute, or about five revolutions per second. A disk *head*, similar to a head in an audio tape deck, is mounted so it can be moved in towards the center of the disk or out towards the periphery. The head is pressed against the surface of the disk to read data from the disk.

The disk head moves in small steps along the disk's radius. In the case of the Color Computer, it takes 34 steps to get from the outermost position to the innermost. Counting the outermost position of the head, this means there are 35 positions for the head, no more and no less, and there is no way to place the head in-between two positions.

Disk Tracks

The 35 positions define 35 disk *tracks*. A track is nothing more than the imaginary path of the disk as it moves under the head at any position. Tracks on the Color Computer are numbered 0 (outermost) to 34 (innermost).

Why 35 tracks? Some disk drives have 40 (for example, the Model III/IV) or more. However, the 35 tracks of the Color Computer are a good compromise between price, storage capacity, and reliability.

The disk head *steps* a track at a time under program control, the program being the disk driver software in the Disk Operating System (DOS). The software always knows what track the disk is on, or if the software does get lost, it can reposition the head (a *restore* operation) back to the outermost track, track 0.

Disk Sectors

Data is stored along each track, but how does the software know where the data is? There could be some kind of synchronizing magnetic pattern, but in fact, the solution is much simpler.

Each disk is divided into *sectors* — arbitrary pie-shaped sections of the disk. You can't actually see the sectors on the surface of the disk, just as you can't see the tracks. They exist only as a pattern of magnetic marks. In the Color Computer there are 18 sectors, numbered 1 through 18. Each sector stores 256 bytes of user data.

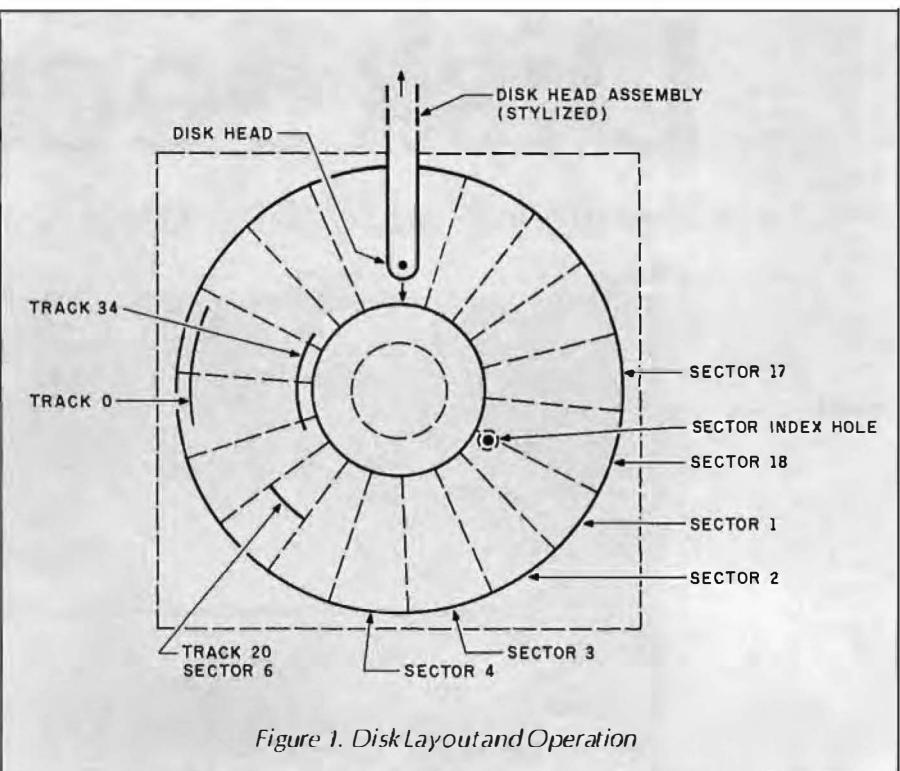


Figure 1. Disk Layout and Operation

Now look for the "sector 0 index hole," which you can see by rotating a disk manually. The disk hardware detects this hole and passes the information on to the disk software. Disks are either *soft sectored* or *hard sectored*. Soft sectored disks have only one sector index hole, and everything is referenced from that hole as the disk spins. Hard sectored disks have multiple holes — one for each sector.

Formatting a Disk

Every disk comes from the factory with no pattern the Color Computer can use, (although there may be a pattern left over from certifying the disk, a process by which the manufacturer verifies that he can write and read data from all parts of the disk at the stated *density*).

Unlike cassette tape, the DOS doesn't start recording user data on a new disk without preparation. Because disk functions require packing as much data on the disk as possible, the disk hardware is designed to work with some helpful identification marks on each disk. The identification marks are magnetically recorded and code the disk's surface with track number, sector number, and other marks. Establishing this skeleton data on the disk is called *formatting* the disk, and is done by the DSKINI function in Basic.

Radio Shack lists the formatting specifications in the *Color Computer Disk System Manual*. They're on page 57 and 58. Chances are you'll never have to use any-

thing related to formatting, unless you write your own disk-operating system, but it's handy to have the information. Formatting data includes a preamble of data after the sector index hole to "sync up" the following data; special index and ID address marks; special checksums called CRCs (cyclic redundancy checks); data address marks indicating that user data follows; a postamble of data.

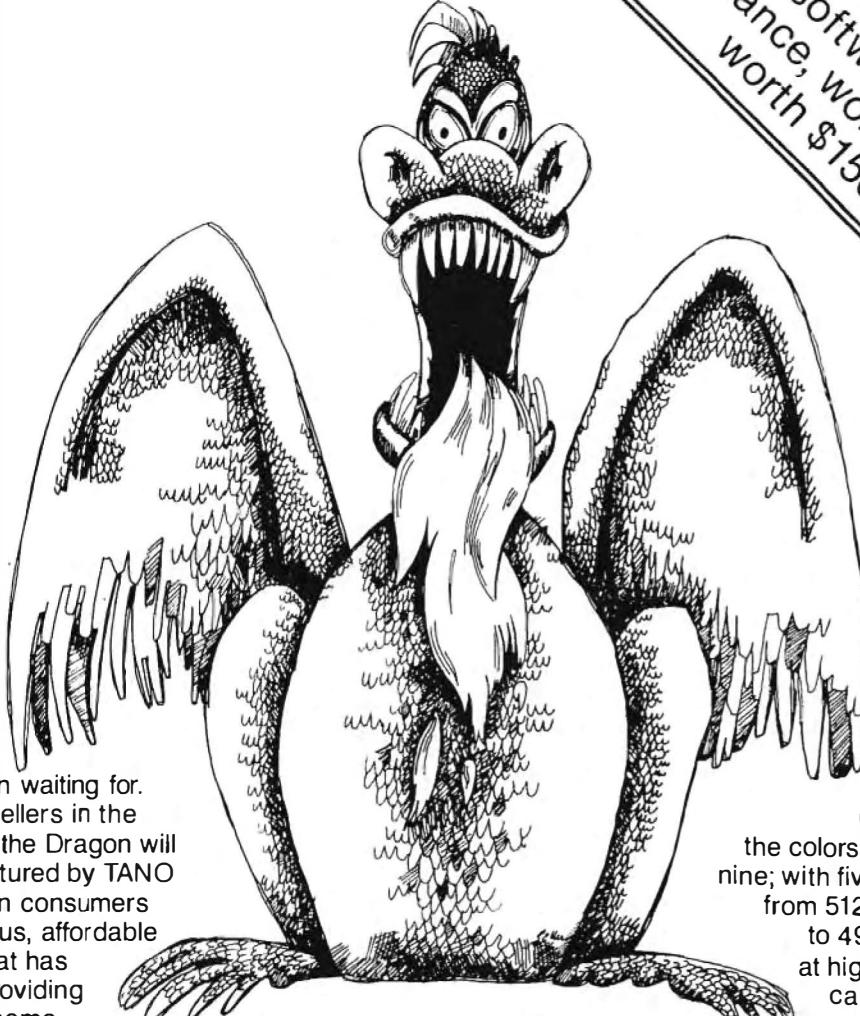
(If you're really interested in disk operations at this level, get the Western Digital Corporation "FD 179X-01 Floppy Disk Formatter/Controller Family" specification, which describes the WD 1793 Floppy Disk Controller chip used in the Color Computer. You won't be able to do anything without this specification. With it, of course, you'll have to work in 6809E assembly language.)

The format data adds about another 25 percent or so to the number of bytes on a disk, which is why you will see specifications on the amount of data that a disk can hold unformatted and formatted.

User Data

Although formatting data is interesting (to a masochist), we're really concerned about *user data*. After formatting, each of the 35 tracks contain vacant spaces for 18 sectors, and each sector can hold 256 bytes of user data. Each clean disk can store 35 tracks x 18 sectors/track x 256 bytes/sector = 161,280 bytes.

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The Disk Operating System

There are actually three levels of disk programming — programming the disk controller, programming a user operating system, and programming the Color Computer DOS.

We could program the disk controller ourselves, using the WD1793 spec, assembly language, and a little bit of luck. As a matter of fact, many of the programs that crack protected software on the Apple, Model III, and so forth do. However, this is very tedious, and if we designed our own disk structure the result would not necessarily be compatible with any other Color Computer disk format.

The second level of programming uses the standard Radio Shack disk format, but the Radio Shack Disk Operating System is circumvented. We'd establish our own directories, disk structure, and file formats.

The third level is to work through the Color Computer DOS, using the operating system software to make directory entries (as in `SAVE`), to delete files (as in `KILL`), and to perform other disk-related operations (such as `DIR` or `MERGE`).

The incredible thing about the Color Computer is that Radio Shack has given you the hooks to easily work with both the second and third options! Not only is the DOS a respectable piece of software (viewed from the Model I DOS perspective, rather than, say, the Unix perspective), but you can directly access any sector and track through the `DSK1$` and `DSK0$` commands! I can even suffer the insipid grins on the Color Computer cartoons in the Radio Shack manual for that!

Disk Structure

Before we get into the programs to read sectors and get a directory, we'll have to look at the disk structure of the Color Computer DOS.

After formatting, we have a formatted disk with spaces left open for user data. After one Save function, however, a *directory entry* and a *file allocation table* have been written to disk.

A *disk directory* is simply a list of file names cross-referenced to where the file is on the disk, along with other useful information. A *file*, by the way, can be any type of user (or system) information — Basic programs (from a `SAVE` command), a memory image (from a `SAVEM` command), a machine language program (from an assembler such as the Micro-Works Macro 80c), or a text file (as from Color Scriptit).

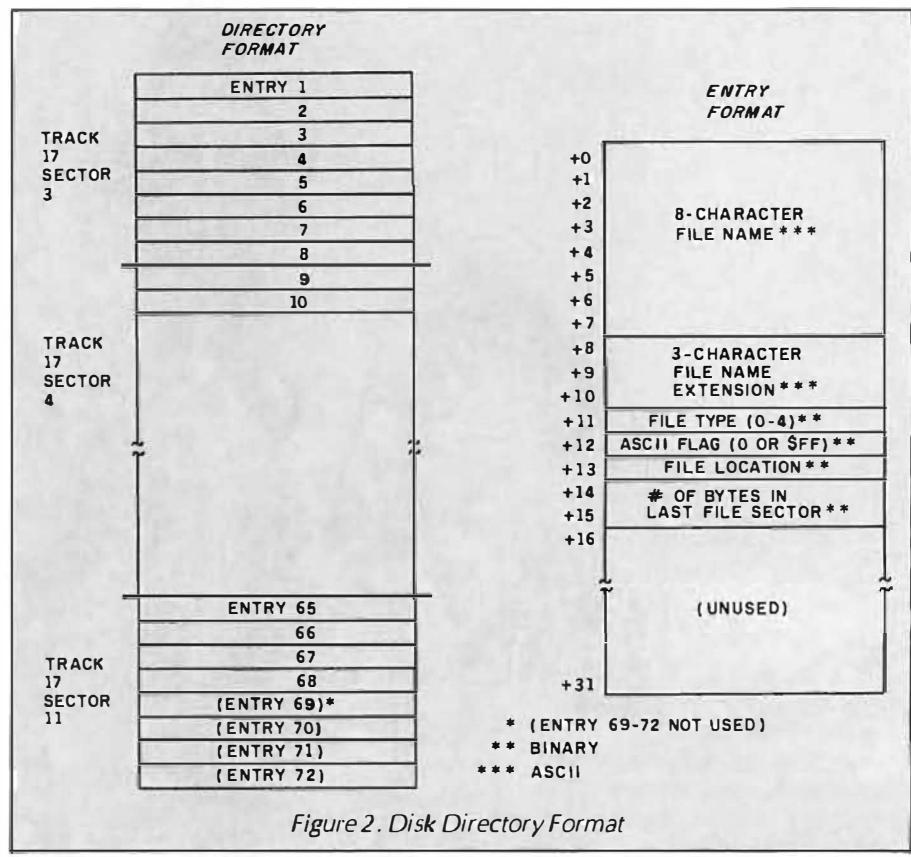


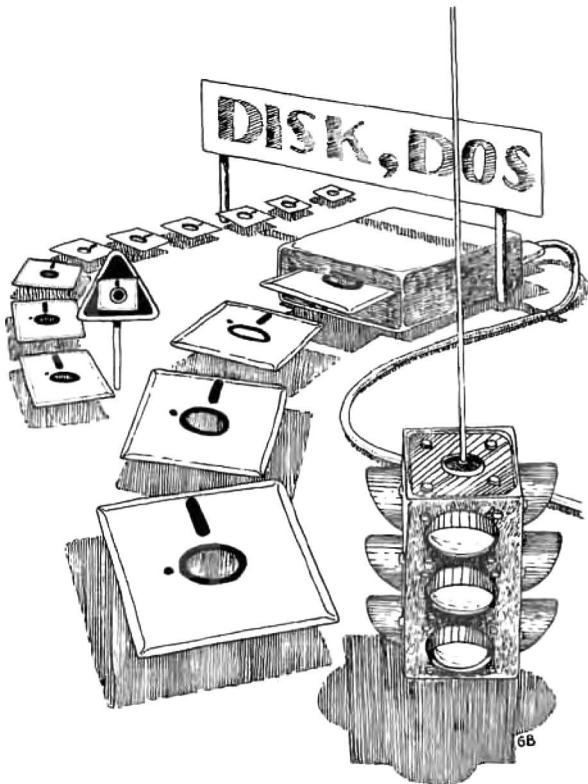
Figure 2. Disk Directory Format

```

DRV #: 0 TRK #: 17 SCTR #: 3   A S %
45 44 20 20 20 20 20 20 20 42 49 4E 02 00 1E 00 6E
E D   B ! N . . . n
42 41 53 00 00 20 00 3C 00 00 00 00 00 00 00 00
B A S . . . <
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
. . . . . . . .
44 43 42 55 47 20 20 20
D C B U G
42 49 4E 02 00 24 00 19
B I N . . $ .
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
. . . . . . . .
58 46 45 52 20 20 20 20
X F E R
42 41 53 00 00 25 00 5F
B A S . . %
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
. . . . . . . .
46 49 4C 45 4C 49 53 54
F I L E L I S T

```

Figure 3. Disk Directory Example



The directory in the Color Computer DOS is located on track 17, sectors 3 through 11. The format of the directory is shown in Figure 2.

Each of the nine sectors allocated for

the directory has places for eight 32-byte entries, making the maximum number of entries 72 in all. (Actually, as we'll see, there can only be 68 separate files due to the way disk space is allocated.) Each of the entries has the following fields:

- Bytes 0 through 7: A file name. This is the name used with SAVE or SAVEM — 1 to 8 characters, with any trailing characters filled with blanks. This name is in ASCII, or printable characters.

- Bytes 8 through 10: File name extension. This is the file name extension, such as BAS for a Basic program, TXT for a text file, or user-defined extension such as AUG. This extension is in ASCII.

- Byte 11: File type. This is a binary value of 0 (Basic program), 1 (Basic data file), 2 (machine language program), or 3 (text editor source file).

- Byte 12: ASCII flag. This is either a binary 0 (binary format file) or \$FF (ASCII format file). ASCII files are in printable ASCII characters rather than tokenized Basic or some other formats.

- Byte 13: File location. The *granule number* of the first portion of the file. This is a binary number; more on this later.

- Bytes 14 and 15: The number of bytes in the last file sector. Again, a binary number; more on this later.

- Bytes 16–31: Unused at present.

- Figure 3 shows a portion of an actual disk directory.

■ ■ ■

Next month — everything else you always wanted to know about disks, but were afraid to ask!

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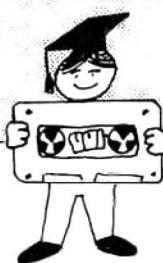
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♦ from page 92

RIPLE JACKPOT":DRAW"BM30,16S8":P
MODE3,1:COLOR4:GOSUB5190:PMODE4,
1:DRAW"S4":GOTO70
5590 GOTO70
5600 T=0:NU=0:LH=0:B2=1:PLAY"T20
03BCDEFG":B\$="GAME OVER":DRAW"S8
BM66,100":PMODE3,1:COLOR4:GOSUB5
180:PMODE4,1:DRAW"S4":PLAY"T2002
":C\$="GFEDC":GOSUB5620:A\$=INKEY\$
5610 A\$=INKEY\$:IFA\$=""THEN5610EL
SEGOSUB5400:GOSUB5030:PMODE4,5:S
CREEN1,1:PMODE4,1:GOSUB5150:GOTO
1160
5620 POKE32749,6:POKE32758,30:PO
KE32754,RND(3)*85:M=USR(0):FORI=
1TOLEN(C\$):PLAYMID\$(C\$,I,1):M=US
R(0):NEXTI:RETURN
10000 FORI=0TO58:READL\$(I):NEXTI
:FORI=1TO4:READSS\$(I):NEXTI:FORI=
1TO5:READX(I):NEXTI:FORI=1TO5:RE
ADX1(I):NEXTI:FORI=1TO5:READY(I)
:NEXTI:FORI=1TO5:READY1(I):NEXTI
:FORI=2TO9:D\$(I)=L\$(16+I):NEXTI:
D\$(10)=L\$(17)+L\$(16):D\$(11)=L\$(4
2):D\$(12)=L\$(49):D\$(13)=L\$(43)
10010 D\$(1)=L\$(33):FORI=1TO5:REA
DX2(I):NEXTI:FORI=1TO5:READX3(I)
:NEXTI:H\$=L\$(40)+L\$(47)+L\$(44)+"
NL1U6NL1R3F1D4G1L3":Q\$=L\$(49)+L\$
(53)+L\$(41)+L\$(52):FORI=0TO14:RE
ADM:POKE32748+I,M:NEXTI:DEFUSR0=
32748:FORI=32583TO32744:READM:PO
KEI,M:NEXTI:DEFUSR1=32583
10020 RETURN
10032 DATA "BM+7,0"
10033 DATA "BM+2,+1U1BM+0,-2U5BM
+5,7"
10034 DATA "BM+1,-4U2BM+2,0D2BM+
4,+4"
10035 DATA "BM+1,0U6BM+2,0D6BM-3
,-4R4BM-4,+2R4BM+3,+2"
10036 DATA "BM+4,-4U1L2NU1ND5L2D
2R4D2L4U1BM+7,+2"
10037 DATA "U1E4U1BM-4,0D1BM+4,+
4D1BM+3,0"
10038 DATA "BM+3,0NE1H3U1E1R1F1G
1L2G1D1F1R1E2BM+4,+2"
10039 DATA "BM+2,-5E1BM+4,+6"
10040 DATA "BM+3,0H2U2E2BM+4,+6"
10041 DATA "BM+1,0E2U2H2BM+6,+6"
10042 DATA "BM+3,-3NU2NR2ND2NL2N
H1NE1NF1NG1BM+4,+3"
10043 DATA "BM+2,-1U2NU2NL2R2BM+
3,+3"

10044 DATA "BM+2,0NU1G1BM+6,-1"
10045 DATA "BM+0,-3R4BM+3,+3"
10046 DATA "BM+2,0U1BM+5,+1"
10047 DATA "U1E4U1BM+3,6"
10048 DATA "BM+1,0H1U4E1R2F1D4G1
L2BM+6,0"
10049 DATA "BM+1,0R1NR1U6G1BM+6,
+5"
10050 DATA "NR4U1E1R1E2U1H1L2G1B
M+7,+5"
10051 DATA "BM+0,-1F1R2E1H2E2H1L
3BM+7,6"
10052 DATA "BM+3,0U2NR1L3U1E3D3B
M+4,3"
10053 DATA "BM+0,-1F1R2E1U2H1L3U
2R4BM+3,+6"
10054 DATA "BM+4,-5H1L2G1D4F1R2E
1U1H1L3BM+7,+3"
10055 DATA "U1E4U1L4BM+7,+6"
10056 DATA "BM+1,-0H1U1E1H1U1E1R
2F1D1G1NL2F1D1G1L2BM+6,0"
10057 DATA "BM+0,-1F1R2E1U4H1L2G
1D1F1R2BM+4,+3"
10058 DATA "BM+2,-1U1BM+0,-2U1BM
+5,+5"
10059 DATA "BM+1,0E1U1BM+0,-1U1B
M+5,+4"
10060 DATA "BM+4,0H3E3BM+3,+6"
10061 DATA "BM+1,-2R3BM-3,-2R3BM
+3,+4"
10062 DATA "BM+2,0E3H3BM+5,+6"
10063 DATA "BM+0,-5E1R2F1D1G2BM+
0,+1D1BM+5,+0"
10064 DATA "BM+1,-4U1E1R1F1D4G1L
2H1U1E1R1F1BM+4,+2"
10065 DATA "U4E2F2D2NL4D2BM+3,0"
10066 DATA "U6R3F1D1G1NL3F1D1G1L
3BM+7,0"
10067 DATA "BM+1,-0H1U4E1R2F1BM+
0,+4G1L2BM+6,0"
10068 DATA "U6R3F1D4G1L3BM+7,0"
10069 DATA "NR4U3NR2U3R4BM+3,+6"
10070 DATA "U3NR2U3R4BM+3,+6"
10071 DATA "BM+1,-0H1U4E1R2F1BM+
0,+2NL1D2G1L2BM+6,0"
10072 DATA "U3NU3R4NU3D3BM+3,0"
10073 DATA "BM+1,0R1NR1U6NL1R1BM
+4,+6"
10074 DATA "BM+0,-1F1R1E1U5NL1R1
BM+3,6"
10075 DATA "U3NU3R1NE3F3BM+3,0"
10076 DATA "NU6R4U1BM+3,+1"
10077 DATA "U6F2ND1E2D6BM+3,0"
10078 DATA "U6F1D1F2D1F1NU6BM+3,
0"
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10079 DATA "BM+1,0H1U4E1R2F1D4G1
L2BM+6,0"
10080 DATA "U6R3F1D1G1L3BM+7,3"
10081 DATA "BM+1,0H1U4E1R2F1D3G1
NH1NF1G1L1BM+6,0"
10082 DATA "U6R3F1D1G1L2NL1F3BM+
3,0"
10083 DATA "BM+0,-1F1R2E1U1H1L2H
1U1E1R2F1BM+3,+5"
10084 DATA "BM+2,+0U6NL2R2BM+3,+6"
10085 DATA "BM+0,-1NU5F1R2E1U5BM
+3,6"
10086 DATA "BM+0,-6D2F1D1F1ND1E1
U1E1U2BM+3,+6"
10087 DATA "NU6E2NU1F2U6BM+3,6"
10088 DATA "U1E4U1BM-4,0D1F4D1BM
+3,0"
10089 DATA "BM+0,-6D2F2ND2E2U2BM
+3,6"
10090 DATA "NR4U1E4U1L4BM+7,6"
10100 DATA "C3H12U6E4R4F4E4R4F4D
6G12C1"
10110 DATA "CONR4L4E4NF4U4G4L4H4
U6E12F12D6G4L4H4C1"
10120 DATA "C3H12E12NU1F12G12C1"

10130 DATA "CONR4L4E4NF4U4G4L4H4
U4E4R4H2U4E4R4F4D4G2R4F4D4G4L4H4
C1"
10140 DATA 18,66,114,162,210,32,
80,128,176,224,30,30,30,30,30,62
,62,62,62,12,60,108,156,204,5
2,100,148,196,244
10150 DATA 142,6,0,166,132,136,2
55,167,128,140,30,0,38,245,57
10160 DATA 0,79,183,127,71,142,33
,1,16,142,31,1,236,132,237,164,4
8,136,32,49,168,32,140,53,1,38,2
41,142,51,3,16,142,51,1,236,132,
237,164,182,127,71,76,129,14,39,
9,183,127,71,48,2,49,34,32,235,1
40,52,253,39,10,79,183,127,71,48
,6,49,38,32,220,142,50
10170 DATA 253,16,142,52,253,236,
132,237,164,48,136,224,49,168,22
4,140,30,253,38,241,79,183,127,7
1,142,32,251,16,142,32,253,236,1
32,237,164,182,127,71,76,129,14,
39,9,183,127,71,48,30,49,62,32,2
35,140,31,1,39,10,79,183,127,71,
48,26,49,58,32,220,142,31
10180 DATA 19,16,142,31,3,236,132
,237,164,48,136,32,49,168,32,140
,33,19,38,241,57

```

■ ■ ■

Whodunit?

```

10 CLEAR 2000
20 GOSUB 1420
30 CLS:GOTO 930
40 REM **MOVEMENT**
50 FOR X=1TO25:IF E(X)=30+P THEN
PRINT"YOU HAVE BEEN CONVICTED O
F REMOVING EVIDENCE FROM TH
E SCENE OF A CRIME. YOU ARE SENTEN
CED TO THE LOSS OF THIS AND YOUR
NEXT TURN":E(X)=P1:T=4:T(P)=1:
T$(P)="IN JAIL FOR REMOVING EVID
ENCE":GOTO1280
60 NEXT X
70 ON N GOTO 110,150,190,230,270

80 IF NOUN$="UP"THEN 290
90 CLS:PRINT:PRINT"      ??????
AY WHAT?????":PRINT:GOTO1290
100 REM
110 IF P1=17 THEN P1=16:GOTO310
120 FOR X=1TO8
130 IF DN(X)=P1 THEN P1=P1-3:GOT
O 310
140 NEXT X:GOTO1070
150 IF P1=16 THEN P1=17:GOTO 310

160 FOR X=1 TO 9
170 IF DS(X)=P1 THEN P1=P1+3:GOT
O 310
180 NEXT X:GOTO1070
190 IF P1=3 THEN P1=22 ELSE IF P
1=9 OR P1=12 THEN P1=18:GOTO 310

200 FOR X=1TO15
210 IF DE(X)=P1 THEN P1=P1+1:GOT
O 310
220 NEXT X:GOTO 1070
230 IF P1=10 THEN P1=1 ELSE IF P
1=18 THEN P1=RND(20):GOTO 310
240 FOR X=1TO14
250 IF DW(X)=P1 THEN P1=P1-1:GOT
O 310
260 NEXT X:GOTO 1070
270 IF P1=22 THEN P1=3 ELSE IF P
1=14 THEN P1=17 ELSE IF P1=20 TH
EN P1=2 ELSE IF P1=24 THEN P1=20
ELSE GOTO 1070
280 GOTO 1060
290 IF P1=22 THEN P1=19 ELSE IF
P1=2 THEN P1=20 ELSE IF P1=20 THE
N P1=24 ELSE IF P1=17 THEN P1=14
ELSE GOTO 1070
300 GOTO 1060

```

♦ more

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Colour Software WorkbenchTM

The Colour Software Workbench (CSW) is a system of machine language programs that run on a 32K or 64K TRS-80 Color Computer Extended Disk Basic System. It lets you develop machine language programs in a combination of Pascal and 6809 Assembler source languages. The 240+ page CSW User's Guide that is included explains the fundamentals of the languages as well as how to use the package.

Part ONE of the CSW User's Guide tells you how to use all of the programs in the Workbench. This first part contains one section for each program.



TEXT EDITOR

- Screen Mode Editing
- Entering Text
- Finding Strings
- Changing Multiple String Occurrences
- Moving, Copying and Deleting Blocks of Text
- Reading, Writing and Merging Files From Tape and Disk

PASCAL COMPILER

- Specifying:
 - Source from Tape, Disk or Keyboard
 - Object and Listing to Tape, Disk, Screen or Printer
- Optional Symbol Table in the Object File for use by the Symbolic Debugger
- Explanation of Source Listing Format

MACRO ASSEMBLER

- Specifying:
 - Source from Tape or Disk
 - Object and Listing to Tape, Disk, Screen or Printer
- Explanation of Source Listing Format

OBJECT LINKER

- Specifying:
 - The Machine Language ORIGIN
 - Listing to Tape, Disk, Screen or Printer
 - Binary File on Disk
 - Whether to use Pascal Runtime Library
 - Whether to use Symbolic Debugger

SYMBOLIC DEBUGGER

- Setting and Clearing Breakpoints
- Displaying and Modifying 6809 and Graphics Registers
- Displaying and Modifying Memory
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- Tracing Pascal Procedure Activations
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Part TWO of the CSW User's Guide provides you with the background information needed to write programs using the Colour Software Workbench.

LEARNING EXERCISE

- Complete Pascal and Assembler Language Source
- Uses All Parts Of the Workbench
- Resulting Program is a Text Processor

PASCAL

- Describes Standard Language Elements Supported
- Constants Include Decimal and Hexadecimal Integers, ASCII characters and strings
- Types Include:
 - Integer, Char, Boolean, Enumerated, Subrange
 - Multi-Dimensioned Arrays
 - Records and Variant Records
 - Sets of Up to 256 Elements
 - Files
- PROCEDUREs and FUNCTIONs with FORWARD
- Variables and LABELs
- Arithmetic, Boolean, and Set Expressions
- Statements: IF, WHILE, REPEAT, CASE, GOTO, EXIT, FOR, BEGIN, assignment (`:=`)
- Input/Output: RESET, REWRITE, READLN, EOF, WRITE, WRITELN, CLOSE, PAGE
- Built-in Functions and Procedures: ABS, CHR, CURSOR, ODD, ORD, PRED, SUCC

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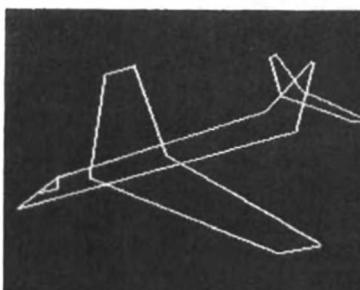
- Strings Support: Assignment, Comparing, Concatenation
- String Procedures and Functions: STRINGCOPY, STRINGDELETE, STRINGINSERT, STRINGPOS, HEX, ENCODE, DECODE
- Type Extensions for Structured Type Breaking
- Absolute Memory Access via Built-in WORD and BYTE Arrays
- ROM Routine Access via CALL Built-in Function
- Static and Public Variable Allocation
- Separate Compilation and Assembler Interface via INTERFACE, EXTERNAL, and PUBLIC
- Listing and Multiple Source File Directives
- Explanation of Error Messages

6809 MACRO ASSEMBLER

- Motorola Compatible Source Conventions
- Macro Facility With up to 9 Macro Parameters
- Separate Compilation and Pascal Interface via PUBLIC and EXT Directives
- Listing Control Directives
- Explanation of Error Messages

TECHNICAL NOTES

- CoCo ROM Compatibility
- Pascal Runtime Library Assembler Interface
- CSW Object File Format



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HIRESLINE,
GRAPHDISPLAY,
MOVESKELETON,
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```

310 IF RN>10 AND E(12)=P1 THEN P
RINT"A DOG HAS BITTEN YOU! YOU L
OSE THIS AND YOUR NEXT TURN." :T
(P)=1:T$(P)="STILL HEALING FROM
DOG BITE":T=4:GOTO 1280
320 IF RN>10 AND E(25)=P1 THEN P
RINT"A CAT HAS JUST SCRATCHED YO
U! YOU LOSE THIS TURN AND YOUR
NEXTTURN." :T(P)=1:T$(P)=" TAKIN
G CARE OF A CAT SCRATCH":T=4:GOT
O1280
330 IF RN<4 AND P1=15 OR P1=23 T
HEN PRINT"YOU HAVE JUST WALKED I
N ON A YOUNG LADY USING THE B
ATHROOM! YOU LOSE THE REST OF T
HIS TURN OUT OF EMBARRASSMENT."
:T=4:GOTO 1280
340 IF RN>19 THEN PRINT"A FLASH
OF LIGHT BLINDS YOU FOR A MOMENT
.":E(26)=P1:FOR X=1TO1500:NEXT X
350 GOTO1060
360 REM **PICK UP**
370 PRINT
380 IF N<5 OR N>LEN(NU$)/3 THEN
PRINT"YOU CAN'T GET THAT!!!!":GOT
O 1290
390 N=N-5
400 IF E(N)=P1 AND N=21 THEN PRI
NTR$(N):GOTO1290
410 IF E(N)=P1 AND N=19 THEN PRI
NT"DON'T BE RIDICULUS-JUST EXAMI
NE IT!":GOTO 1290
420 IF E(N)=P1 THEN E(N)=30+P:PR
INT"O.K., I'M HOLDING IT.":GOTO1
290
430 PRINT"I DON'T KNOW WHAT YOU'
RE TALKING ABOUT- I DON'T
SEE "E$(N)".":GOTO 1290
440 REM ** DROP **
450 IF NOUN$="GUN"THEN PRINT"IT
WOULD BE STUPID TO DROP YOUR GUN
!":GOTO 1290
460 N=N-5:IF N>27OR N<1 THEN 530
470 IF N=27AND P1=18AND P=TI THE
NCLS:PRINT"OK-IT SANK TO THE BOT
TOM AND I CAN'T SEE IT":PRINT"C
ONGRATULATIONS. YOU HAVE BEEN S
UCCESSFUL AT HIDING YOUR V
ICTIM'S BODY!":PRINT"THE CASE HA
S BEEN THROWN OUT OF COURT DUE T
O LACK OF EVIDENCE."ELSE 490
480 PRINT:PRINTG$(TI)" IS THE VI
CTOR!":GOTO 900
490 IF N=27 AND P1=18 THEN PRINT
"You HAVE BEEN CONVICTED AS AN

```

```

ACCOMPlice TO MURDER. YOU HAVE
BEEN SENTENCED TO THE LOSS OF
THIS AND THE NEXT THREE TURNS."
:E(27)=24:T(P)=3:T=4:T$(P)="CONV
ICTED AS MURDER ACCOMPlice":GOTO
1280
500 IF E(N)=30+P THEN E(N)=P1:GO
TO 520
510 GOTO 530
520 PRINT"O.K. I'VE DROPPED IT."
:GOTO 1290
530 PRINT"I CAN'T DROP WHAT I DO
N'T HAVE!":GOTO 1290
540 REM *EXAMINE*
550 IF NOUN$="GUN"THEN PRINT"MFG
.BY COLT":GOTO 1290
560 PRINT:N=N-5:IF N>27 OR N<1 T
HEN610
570 IF N=19 AND E(N)=P1 THEN PRI
NTR$(N):GOTO 1290
580 IF N=1 OR N=6 OR N=13 OR N=1
7 OR N=24 AND E(N)=P1 THEN PRINT
"IT'S NOT A RABBIT":GOTO 1290
590 IF N=26 AND E(N)=30+P THEN T
=T-2
600 IF E(N)=30+P THEN PRINT R$(N
):E(26)=0:GOTO1290
610 PRINT"I DON'T HAVE IT!":GOTO
1290
620 PRINT"i'm carrying":PRINT"A
GUN"
630 FOR X=1TO27:IF E(X)=30+P THE
N PRINTE$(X)", ";
640 NEXT X:PRINT:GOTO 1290
650 PRINT:FOR X=1TO5
660 IF LEFT$(G$(X),3)=NOUN$ THEN
680 ELSE NEXT X
670 PRINT"THAT'S BEYOND DESCRIPT
ION.":GOTO1290
680 CLS:PRINT@43,G$(X):PRINTD$(X
):PRINT@483,"PRESS <ENTER> TO CO
NTINUE"
690 X$=INKEY$:IF X$<>" "THEN1070
ELSE 690
700 CLS:FOR X=1TO5:PRINTX"--"G$(X
)--"CL$(X,P):NEXT X
710 PRINT:INPUT"ADD CLUE(Y/N)":C
$:IF C$="N"THEN 1290
720 IF C$<>"Y"THEN 710
730 INPUT "WHO(1-5)":X
740 PRINT "TYPE CLUE(SHORT) FOR
"G$(X)". ";:LINE INPUT CU$(X)
750 CL$(X,P)=CL$(X,P)+CU$(X)+", "
760 GOTO700
770 PRINT:FOR X=1TO5

```

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```

780 IF LEFT$(G$(X),3)=NOUN$ THEN
800 ELSE NEXT X
790 PRINT" FIND IT YOURSELF!!!":G
OTO1290
800 PRINTG$(X)" IS IN THE "L$(G(
X)):GOTO 1290
810 IF NOUN$="COR" THEN PRINT"TH
AT'S SICK!!!":GOTO 1290 ELSEFOR
X=1TO5:IF LEFT$(G$(X),3)<>NOUN$
THEN NEXT X:PRINT"YOU CAN'T SHOO
T THAT.":GOTO1290
820 IF G(X)<>P1 THEN PRINTG$(X)"
IS NOT HERE!":GOTO 1290
830 IF X=P THEN PRINT"YOU HAVE I
NJURED YOURSELF- YOU LOSE THIS
AND YOUR NEXT TURN!":T(P)=1:T$(P)
)=" SHOULDNT PLAY WITH GUNS":T
=4:GOTO 1280
840 IF G$(X)=G$(TI) THEN CLS:PRI
NT"CONGRATULATIONS ON SEEING THA
T JUSTICE WAS DONE!! YOU HAVE
SUCCESSFULLY SOLVED THIS MURD
ER MYSTERY BY SHOOTING "G$(TI):P
RINT:PRINTG$(P)" IS THE BEST":PR
INT"DETECTIVE EVER!":GOTO900
850 IF RN>15 THEN PRINT"YOUR SHO
T MISSED! IT RICOCHETED AND KILL

```

```

880 PRINT"YOU'RE LUCKY YOUR GUN
MISSFIRED.YOU SHOT AT AN INNOCEN
T PERSON!!":GOTO 1280
890 CLS:PRINT"YOU HAVE ALL DIED!
WHAT A BUNCH OF INCOMPETENT DET
ECTIVES!!":PRINT:PRINT"FOR YOUR
INFORMATION THE KILLER WAS "G$(T
I)"."
900 PRINT:INPUT" ANOTHER MYSTERY
(Y/N)":X$:IF X$="Y" THEN RUN
910 PRINT"PLEASE! Q$"?":INPUT X$:
IF LEFT$(X$,1)="N"THEN Q$=Q$+"!
":GOTO 910
ED YOU!!!":A(P)=10:T=4:GOTO1280
860 IF RN<7 THEN PRINT"YOU INJUR
ED "G$(X)".":PRINT"YOU HAVE BEEN
SENTENCED TO DIE FOR ATTEMPTED
MURDER":T=4:T(X)=1:T$(X)="WAS I
NJURED BY A MANIAC KILLER":A(P)=
10:GOTO 1280
870 IF RN<11 THENPRINT"YOU HAVE
SHOT AT AN INNOCENT PERSON. Y
OU ARE QUITE LUCKY THISTIME- YOU
MISSED HIM BUT YOU LOSE THIS
AND FOUR TURNS.":T(P)=4:T$(P)=
"SHOULDNT SHOOT INNOCENT PEOPLE"
:T=4:GOTO 1280

```

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920 PRINT"THANK YOU, I THOUGHT Y
OU MIGHT.":FOR X=1TO1500:NEXT X:
RUN
930 FOR P=1TO5
940 IF P>5 THEN GOTO 930
950 IF A(P)=10 THEN FOR X=1TOY:I
F A(X)<>10 THEN NEXTP ELSE NEXT
X:GOTO 890
960 IF G1(P)=1 THEN G(P)=G(P)+1
970 IF G1(P)=1 AND G(P)>24 THEN
G(P)=1
980 IF G1(P)=1 THENNEXT P:GOTO 9
30
990 PLAY "V30;L15;A"
1000 IF T(P)<=0 THEN 1030
1010 IF T(P)>0 THEN CLS:PRINT@17
4,G$(P):PRINT@225,T$(P):PRINT@29
9,"LOSES TURN":PRINT@483,"PRESS
<ENTER> TO CONTINUE":T(P)=T(P)-1
1020 X$=INKEY$:IF X$<>CHR$(13)TH
EN 1020 ELSE NEXT P:GOTO 930
1030 CLS:PRINT@174,G$(P):PRINT@2
28,"PRESS <ENTER> TO CONTINUE"
1040 X$=INKEY$:IF X$<>CHR$(13)TH
EN 1040
1050 P1=G(P):T=0

```

```

1060 T=T+1
1070 CLS:PRINT"i'm in the "L$(P1
)
1080 PRINT"i see.":PRINTOS(P1)
1090 FOR X=1TO5:IF G(X)<>P1 THEN
NEXT X:GOTO 1120
1100 IF X<>P THEN PRINT G$(X)" I
S HERE."
1110 NEXT X
1120 FOR X=1TO27
1130 IF E(X)<>P1 THEN NEXT X:GOT
O 1150
1140 PRINTES(X):NEXT X
1150 PRINT"it looks like i can g
o:"
1160 FOR X=1TO8
1170 IF DN(X)=P1 THEN PRINT"NORT
H,":ELSE NEXT X
1180 FOR X=1TO9
1190 IF DS(X)=P1 THEN PRINT"SOUT
H,":ELSE NEXT X
1200 FOR X=1TO15
1210 IF DE(X)=P1 THEN PRINT"EAST
,":ELSE NEXT X
1220 FOR X=1TO14
1230 IF DW(X)=P1 THENPRINT"WEST,
":ELSE NEXT X

```

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```

1240 FOR X=1TO4
1250 IF DD(X)=P1 THEN PRINT"DOWN
,";ELSE NEXTX
1260 FOR X=1TO4:IF DU(X)=P1 THEN
PRINT"UP,";ELSE NEXT X
1270 PRINT
1280 G(P)=P1:IF T=4 THEN FOR X=1
TO2400:NEXT X:NEXTP:GOTO 930
1290 PRINT"what now "G$(P);:INPU
T A$
1300 RN=RND(20)
1310 IF LEFT$(A$,4)="LOOK" THEN
1070
1320 IF A$="VOC"THEN GOSUB 2290:
GOTO 1290
1330 FOR X=1TOLEN(A$)
1340 IF MID$(A$,X,1)<>" "THEN NE
XT X
1350 NOUN$=MID$(A$,X+1,3)
1360 FOR N=1TO(LEN(NU$)/3)
1370 IF MID$(NU$,3*N-2,3)<>NOUN$  
THEN NEXTN
1380 VERB$=LEFT$(A$,2)
1390 FOR V=1TOLEN(VR$):IF MID$(V
R$,2*V-1,2)<>VERB$ THEN NEXT V
1400 ON V GOTO 40,540,360,440,65
0,770,810,620,700
1410 GOTO 90
1420 CLS:PRINT@74,"***WHODUNIT***"
:PRINT@168,"A MURDER MYSTERY":PR
INT@271,"BY":PRINT@330,"DAVE VIN
NEDGE":PRINT@459,"AUGUST 1983":F
OR X=1TO1500:NEXT X
1430 DIM L$(25),DN(8),DS(9),DE(1
5),DW(14),DD(4),DU(4),O$(24),E$(  
27),E(27),R$(27),CLS(5,5)
1440 VR$="GOEXGEDRDELOSHINCL":NU
$="NORSOUAEASWESDOWWHIHA13X5ALCEM
PBLAREDCHIPAGSTOSTUDOGBLOCANGART
ONBROSILHAZBIRDIRBATRONO CATANC
COR"
1450 IT=RND (5)
1460 M1$="T4O2L2B03CC#CO2B03CC#C
"
1470 M2$="T2O3L8EL16F#F#L8F#L4F#
L8EEEEL16GGL4GL8F#F#F#"
1480 M3$="O4L8D#L2D03L8BAL1B"
1490 M4$="O3L8EL4GO4L8D#L4.DL160
3GL8A#L2.B"
1500 M5$="L4O3GL16AGL4.F#L8O2B03
D#L4EP16"
1510 M8$="O3L8BBP5BBP5BBL8.BL8BL
16BL8BBP3"
1520 FOR X=1TO24:READL$(X):NEXT
1530 FOR X=1TO8:READ DN(X):NEXT
1540 FOR X=1TO9:READ DS(X):NEXT

```

```

1550 FOR X=1TO15:READDE(X):NEXT
1560 FOR X=1TO14:READDW(X):NEXT
1570 FOR X=1TO4:READ DD(X):NEXT
1580 FOR X=1TO4:READ DU(X):NEXT
1590 FOR X=1TO24:READOS(X):NEXT
1600 FOR X=1TO5
1610 C=RND(5):IF C=C1 OR C=C2 OR
C=C3 OR C=C4 OR C=C5 THEN 1610
1620 IF IT=X THEN TI=C
1630 READ D$(C):READ G$(C):READ
G1(C)
1640 ON X GOTO 1650,1660,1670,16
80,1690
1650 C1=C:NEXT X:GOTO1720
1660 C2=C:NEXT X:GOTO1720
1670 C3=C:NEXT X:GOTO1720
1680 C4=C:NEXT X:GOTO1720
1690 C5=C:NEXT X
1700 FOR X=1TO27:READE$(X):NEXT
1710 FOR X=1TO27:READRS(X):NEXT
1720 CLS:PRINT" WELCOME LADIES AN
D GENTLEMEN AND THANK YOU FOR ACC
EPTING THIS INVITATION TO THE
GREAT WHODUNITMYSTERY.":PRINT:I
NPUT"DO YOU NEED INSTRUCTIONS (Y
/N)":Y$
1730 IF Y$="YES"OR Y$="Y" THEN G
OSUB 2210:GOTO 1750
1740 IF Y$="N"OR Y$="NO"THEN 1750
ELSE 1720
1750 CLS:INPUT" PLEASE INDICATE T
HE NUMBER IN YOUR PARTY. (2-5)
";Y
1760 IF Y>5 OR Y<2THEN 1750
1770 CLS:PRINT" THANK YOU, THAT'S
FINE. NOW COULD YOU PLEASE
SIGN OUR GUEST REGISTER:"
1780 FOR X=1TOY
1790 PRINT"GUEST #";INPUT G$(X
)
1800 FOR XY=0TOX-1:IF LEFT$(G$(X
),3)=LEFT$(G$(XY),3) THEN PRINTG
$(X)" AND "G$(XY)" SOUND":PRINT"
ALIKE TO ME. USE A DIFFERENT
NAME FOR "G$(X)", GUEST #";XY=X
:NEXTXY:GOTO1790
1810 NEXT XY
1820 T(P)=0:G1(X)=2:NEXT X
1830 CLS:PRINT" THE FOLLOWING ARE
CHARACTER DESCRIPTIONS.":PL
AY"XM1$;"
1840 FOR X=1TO5
1850 CLS:PRINT@45,G$(X):PRINTD$(X)
1860 PLAY "XM2$;XM3$;XM8$;XM2$;X

```

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M3\$;XM5\$;P4"
 1870 NEXT X
 1880 CLS:PRINT@195,"AND LET THE
 MYSTERY BEGIN...."
 1890 PLAY M4\$
 1900 FOR X=1TO1000:NEXT
 1910 FOR X=0TO20 STEP 5:E((C1+X)
)=RND(24):E((C2+X))=RND(24):E((C
 3+X))=RND(24):NEXT X
 1920 E((IT*5-5+(C4)))=RND(24)
 1930 G=1:FOR X=1TO5
 1940 G(X)=RND(24)
 1950 NEXT X
 1960 E(27)=RND(25):IF E(27)=18 T
 HEN 1960
 1970 RETURN
 1980 DATA KITCHEN,HALL,LIVING RO
 OM,DINING ROOM,HALL,DEN,LIBRARY,
 HALL,GAME ROOM,SERVENTS QUARTERS
 ,HALL,GARAGE,MUSIC ROOM,HALL,BAT
 HROOM,WINE CELLAR,BASEMENT,SWIMM
 ING POOL,MASTER BEDROOM,BALCONY,
 GUEST BEDROOM,CHIMNEY,UPSTAIRS B
 ATH,ATTIC
 1990 DATA 4,5,8,9,11,14,17,23,1,
 2,5,6,8,11,16,19,20,1,2,3,4,5,7,

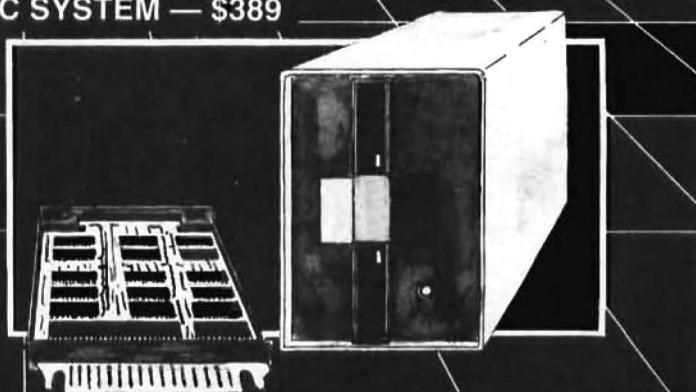
8,9,10,11,12,13,14,19,20,2,3,5,6
 ,8,9,10,11,12,14,15,18,20,21,14,
 20,22,24,2,17,20,22
 2000 DATAA LARGE POT OF CLAM CHO
 WDER SIMMERING ON THE STOVE.
 A SINK FULL OF DIRTY DISHES.,A
 SPIRAL STAIRCASE WITH CHROME R
 AILING LEADING UP.,A BRICK FIREP
 LACE WITH A LARGE MANTLE ON THE
 EAST WALL.
 2010 DATAA BEAUTIFUL CRYSTAL CHA
 NDELIER. A CHINA HUTCH ON THE SO
 UTH WALL.
 2020 DATALOTS OF PLANTS UNDER A
 LARGE SKYLIGHT.,A LARGE OAK DESK
 AND COLOR COMPUTER,LOTS OF
 BOOKS,A BEAUTIFUL PAINTING ON T
 HE EASTWALL.,A COLOR COMPUTER CO
 NNECTED TO A GIANT SCREEN T.V.,A
 COZY LITTLE ROOM,A COAT RACK,A
 LARGE CAR. LOTS OF TOOLS.
 2030 DATAA GRAND PIANO IS IN THE
 CENTER OF THE ROOM--THERE IS A
 GOLD CANDELABRA ON IT.,A DIM
 LY LIT CORRIDOR WITH A NARRO
 W STAIRCASE WINDING DOWN.,A SUNK

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EN TUB, LOTS OF DUSTY BOTTLES, A DIRTY ROOM WITH LOTS OF EMPTY CRAFTS

2040 DATAA LARGE KIDNEY SHAPED POOL WITH SPARKLING BLUE WATER., A KINGSIZE WATERBED AND STONE FIREPLACE ON SOUTH WALL., A WROUGHT IRON RAILING, A MIRRORED CEILING AND SUNKEN JACUZZI TUB., SOOT, SMALL BUT PRACTICAL ROOM, DUST-OLD CLOTHES-LOTS OF BOX'S

2050 DATAIS THE VICTIM'S GRANDMOTHER. SHE IS PLUMP AND JOLLY WITH WHITE HAIR WORN IN A BUN. SHE IS ALWAYS SEEN WEARING A COOKING APRON AND WHITE SILK STOCKINGS. SHE WEARS WIRE RIMMED SPECTACLES AND LOVES COLA (JUST A SPLASH OF RUM).

2060 DATAGRANDMA,1

2070 DATAIS THE MAID. SHE'S VERY TALL AND THIN. SHE HAS LONG BLACK HAIR WHICH SHE WEARS IN A Braid TIED WITH A RED RIBBON. SHE IS ALWAYS SEEN WITH A FEATHER DUSTER IN ONE HAND AND A DIME ROM

ANCE NOVEL IN THE OTHER.

2080 DATAMAID,1

2090 DATAIS THE LONG LOST DAUGHTER WHO'S SHOWN UP AT THE WILL READING. SHE IS VERY SEXY AND SENSUOUS. HER HAIR IS CURLY AND BLONDE-HEREYES BLUE. SHE DIETS (BUT IS KNOWN TO HIDE CANDY BARS) SHE WEARS THE LATEST IN DESIGNER FASHION.

2100 DATADAUGHTER,1

2110 DATAIS THE FAMILY DOCTOR. HE'S IN HIS MID 50'S. HE IS VERY DISTINGUISHED LOOKING WITH HIS PIPE. HE HAS BROWN HAIR WHICH IS SLIGHTLY GREYING AROUND THE TEMPLES. HE HAS A SLIGHT GERMAN ACCENT.

2120 DATADOCTOR,1

2130 DATAIS THE GARDENER. EXCEPT FOR A FEW GREY HAIRS HE IS BALD. HE ALWAYS HAS TOOLS HANGING FROM HIS WAIST AND HIS HANDS ARE USUALLY COVERED WITH SOIL. SPEAK LOUDLY- HE IS HARD OF HEARING.

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Color Computer/111

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2140 DATAGARDENER,1

2150 DATAA WHITE HAIR,A HAIRPIN,
A 3X5 CARD,AN ALCOHOL BOTTLE,AN
EMPTY GLASS CASE,A BLACK HAIR,A
RED THREAD,A CHICKEN(?) FEATHER,
A PAGE TORN FROM A BOOK,A STORE
RECEIPT,A STUB OF AN AIRLINE TIC
KET,A DOG SNIFFING THE GROUND,A
BLONDE HAIR

2160 DATAA CANDY WRAPPER,A GARM
ENT BAG,A TONGUE DEPRESSOR,A BROW
N HAIR,A SILVER MEDALLION,A HAZE
IN THE AIR,A BIRTHDAY CARD,DIRT
STAINS,A BATTERY,A TROWEL,NO HA
IR AT ALL,A CAT TWITCHING HER NO
SE,AN ANCIENT LOOKING SCRIPT,A C
ORPSE

2170 DATA,TO PIN A BUN,A RECIPE
FOR APPLE PIE,FOR INTERNAL USE O
NLY,MFG. BY THE WIRE RIM GLASS C
O.,,LEADS TO A RIBBON,I CAN'T SE
E THROUGH ALL THE DUST,HER HANDS
BECAME WET WITH PER- SPIRATION
AS THEIR EYES MET...

2180 DATATHANK YOU FOR SHOPPING
AT THE TALL GIRLS SHOP,JAN. 21
ST...THE SAME DAY AS THE WILL RE
ADING,HE SMELLS PERFUME-VERY SEX
Y AND SENSUOUS,,NEW AND IMPROVED
,A HALSTON ORIGINAL

2190 DATALOOKS LIKE A POPSICLE S
TICK,,SOME KIND OF WRITTING-MAYB
E GERMAN,LOOKS AND SMELLS LI
KE PIPE SMOKE,HAPPY 54TH,GO LOOK
IN YOUR GARDEN IF YOU WANT TO
EXAMINE SOME DIRT,QUITE SMALL-M
AYBE FROM A HEARINGAID

2200 DATABRIGHT SILVER WITH WOOD
HANDLE,,SHE SMELLS PESTICIDES A
ND MANURE,YOU ARE WELL LIKED- YO
U GET TWO EXTRA MOVES THIS TURN.
,FEELS CLAMMY- SMELLS TERRIBLE

2210 CLS:PRINT" WHODUNIT IS A MU
RDER MYSTERY GAME FOR 2-5 PLAY
ERS. THE COM- PUTER WILL SELECT
ONE OF THE CHARACTERS AT RAN
DOM AS THE MURDERER. IT WILL
THEN PLACE CLUES THROUGHOUT
THE HOUSE."

2220 PRINT"IT'S THEN YOUR JOB TO
ROAM ABOUTTHE HOUSE GATHERING I
NFORMATION.BE CAREFUL NOT TO ACC
USE SOME-"

2230 PRINT"ONE PREMATURELY BECAUS
E THERE WILL BE CLUES POINTIN

G TO EVERY-ONE! HOWEVER THERE WILL BE FOUR CLUES POINTING TO THE GUILTY PERSON WHILE EVERYONE ELSE WILL HAVE FEWER." :PRINT@484, "PRESS ENTER TO CONTINUE"; :INPUT X\$

2240 CLS:PRINT"IF YOU ARE NOT SURE WHO A CLUE BELONGS TO YOU MAY EXAMINE IT, BUT IT IS UNLAWFUL TO REMOVE EVIDENCE FROM A ROOM.

ONCE YOU FEEL YO

U KNOW WHO THE MURDERER IS IT IS YOUR JOB TO FIND AND ELIMINATE HIM/HER."

2250 PRINT"IF YOU FEEL THAT YOU ARE THE GUILTY PERSON YOU MUST THEN FIND AND HIDE THE BODY. (THE SWIMMING POOL IS A GOOD PLACE TO HIDE A BODY.)

A COMPUTER SCRATCH PAD IS PROVIDED FOR KEEPING TRACK OF CLUES"

2260 PRINT@484, "PRESS ENTER TO CONTINUE"; :INPUT X\$

2270 CLS:PRINT" THE GAME IS PLAYED BEST WHEN ONLY THE PERSON WHOSE TURN IT IS CAN SEE THE SCREEN, BUT THAT IS LEFT UP TO YOU TO DECIDE.

2280 PRINT@484, "PRESS ENTER TO CONTINUE"; :INPUT X\$

2290 CLS:PRINT" THE AVAILABLE VERBS ARE:" :PRINT:PRINT"GO ----- TO MOVE":PRINT"GET ----- TO PICK UP OBJECTS":PRINT"EXAMINE ----- TO LOOK AT EVIDENCE":PRINT"DROP ----- TO DROP OBJECTS":PRINT"DESCRIBE - DESCIBES A CHARACTER"

2300 PRINT"LOCATE --- TO FIND A CHARACTER":PRINT"SHOOT ---- TO DEAL WITH MURDERER"; :PRINT"LOOK ----- GIVES YOUR LOCATION":PRINT"INV ----- LIST WHAT YOU HOLD":PRINT"VOC ----- LIST THESE VERBS":PRINT"CLUE ----- SCRATCH PAD"

2310 PRINT@484, "PRESS ENTER TO CONTINUE"; :INPUT X\$

2320 CLS:PRINT"EXCEPT FOR", ",,",*LOOK", ",,*INV", ",,*VOC", ",,*CLUE":PRINT:PRINT"WHICH ARE USED ALONE, USE TWO WORD COMMANDS SUCH AS":PRINT:PRINT"*GO NORTH"

2330 PRINT@483, "PRESS ENTER TO CONTINUE"; :INPUT X\$

2340 CLS:RETURN

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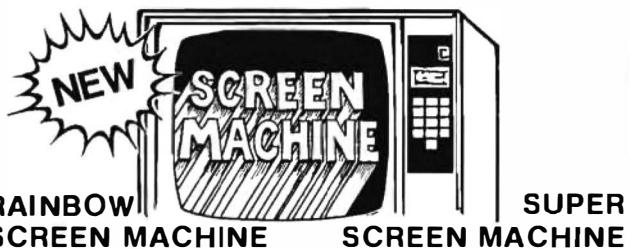
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Mail List

Store many, many names and addresses.

by Mike Charlton



16K Disk Extended Color Basic



After owning a TRS-80 Model I tape-based system for three years, I sold it and upgraded to a 16K Extended Basic Color Computer with a single disk drive.

My limited experience with a Model I disk system was filled with spontaneous reboots and numerous other disk errors. So, the reliability of the Color Computer disk system pleased me. After a month of use, I decided to give it a rigorous test. What developed was the mailing list system using random access files in Program Listings 1 and 2.

I designed the system to store names and addresses. It will hold 100 data records of 64 characters each. These are broken down into 20 characters for the name, 21 for the address, 16 for the city, two for the state, and five for the zip code. With minor modifications, it could be used as a general database system. More about this later.

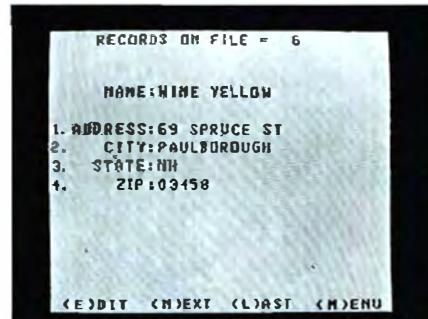
I give credit to Jim Dantin for the file handling techniques. He first developed them for a Hewlett-Packard HP-125 system and I adapted them for the Color Computer.

A key array keeps track of the data records' location in the random file. This array is stored on the disk as a sequential file and is brought into memory at the beginning of the program. The array is

then saved back to disk after any operation where changes are made. Each element of the array is the 20-character name field of a record, and a number that tells the program where in the random file the associated record resides.

This is a no-frills system. It offers the basic functions of inputting records, editing records, viewing records, printing records, and deleting records. The program performs minimal error checking and includes no output formatting. I leave these enhancements to you.

Program Listing 1 is for file initialization; it creates the key array sequential file MLKEY.FIL and fills it with zeros and nulls. It also creates the main random access data file MLIST.FIL and puts a pointer in the first record that gives the location



"Mail List" Screen



of the first available record. The remaining records are filled with nulls.

CAUTION: Run this program only once for each database established. If it is run again, it will wipe out all existing data in the file!!

Using the Program

The first step is to load and run Program Listing 1, FILEINIT.BAS. The only user input required by this program is at the beginning when you are asked if it's OK to clear files. Answer YES. This step is a safeguard against erasing data files. Now load and run Program Listing 2, MLIST.BAS. The main menu appears and offers the available options. Choose the Enter Records option. Enter the name in the format of last name first. After entering a few records, return to the main menu to try out the other options. I have worked out all the bugs, but would appreciate hearing of any I might have missed.

You can easily modify the system to hold other types of information. The simplest modification would be to use the same number and lengths of fields,

Program Listing 1. File Initialization

```

100 'FILEINIT.BAS
110 'MAIL LIST SYSTEM
120 'MIKE CHARLTON
130 'JANUARY 1983
140 PMODE0,1:PCLEAR1:CLEAR2200:CLS
150 'THIS PROGRAM BUILDS EMPTY FILES
160 INPUT"THIS WILL CLEAR FILES-OK";A$
170 IF A$<>"Yes"THEN 480
180 'MAIL LIST KEY ARRAY FILE
190 PRINT"INITIALIZING MAIL LIST KEY ARRAY"
200 DIM KEY(100),KEY$(100)
210 FOR I=1 TO 100
220 KEY(I)=0
230 KEY$(I)= STRING$(20,32)
240 NEXT I
250 OPEN "O",#1,"MLKEY.FIL"
260 KEY(0)=0
270 PRINT #1,KEY(0)
280 FOR I = 1 TO 100
290 PRINT"RECORD";I

```

```

300 PRINT #1,KEY(I);",KEY$(I)
310 NEXT I
320 CLOSE #1
330 PRINT"DONE":PRINT
340 'MAIL LIST FILE
350 PRINT"INITIALIZING MAIL LIST FILE"
360 OPEN "D", #2, "MLIST.FIL",64
370 FIELD #2,20 AS NA$,21 AS AD$,
16 AS CI$,2 AS ST$,5 AS ZI$
380 LSET NA$="2"
390 LSET AD$="" :LSET CI$=""
400 LSET ST$="" :LSET ZI$=""
410 PUT #2,1
420 LSET NA$=""
430 FOR I = 2 TO 100
440 PRINT"RECORD";I
450 PUT #2,I
460 NEXT I
470 CLOSE #2:PRINT"DONE":GOTO 490
480 CLS:PRINT"ERROR-TRY AGAIN"
490 END
■ ■ ■

```

but change the names of the fields. A more ambitious project would be to change the number of fields, lengths of fields, and names of fields. This is not hard to do, but take care to change all references to these variables to their new values.

Line By Line

The main program is shown in Listing 2. Line 140 frees up maximum memory for text and clears enough string space for the key array. Lines 150–180 dimension and initialize this string space for the key array. Lines 210–300 are the main menu. Lines 1000–1490 are for inputting data records. Lines 2000–2300 are for deleting records. Lines 3000–3410 are for viewing or editing records. Lines 4000–4200 print the records. Subroutine 10000 reads the key array from disk. Subroutine 11000 writes the key array to disk. Subroutine 12000 opens and fields the randomdata file.

Program Listing 2. Mail List

```

100 'MLIST.BAS"
110 'MAIL LIST SYSTEM
120 'MIKE CHARLTON
130 'JANUARY 1983
140 PMODE0,1:PCLEAR1:CLEAR2500
150 DIM KEY(100),KEY$(100)
160 FOR I=1 TO 100
170 KEY(I)=0:KEY$(I)=""
180 NEXT I
190 GOSUB 10000
200 A$=STRING$(22,32)+STRING$(22,8)
210 'MAIN MENU
220 CLS:PRINT@71,"(E)NTER RECORD S"
230 PRINT@103,"(D)ELETE RECORDS"
240 PRINT@135,"(V)IEW/EDIT RECORDS"
250 PRINT@167,"(P)RINT RECORDS"

```

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```

260 PRINT@199,"(Q)UIT PROGRAM"
270 PRINT@295,"OPTION?";
280 O$=INKEY$: IF O$="" THEN 280
290 ON INSTR("QEDVP",O$) GOTO 31
0,1000,2000,3000,4000
300 GOTO270
310 CLOSE:END
1000 'ENTER RECORDS
1010 GOSUB12000:GET #2,1:FA=VAL(
NA$)
1020 CLS:PRINT@4,"RECORDS ON FIL
E = ";KEY(0)
1030 PRINT@101,"NAME":PRINT@160
,"1.ADDRESS:"
1040 PRINT@192,"2. CITY":PRIN
T@224,"3. STATE:"
1050 PRINT@256,"4. ZIP:"
1060 PRINT@106,A$;
1070 LINEINPUTN1$ :IF LEN(N1$)>20
THEN1060
1080 PRINT@170,A$;
1090 LINEINPUTA1$ :IF LEN(A1$)>21
THEN1080
1100 PRINT@202,A$;
1110 LINEINPUTC1$ :IF LEN(C1$)>16
THEN1100
1120 PRINT@234,A$;
1130 LINEINPUTS1$ :IF LEN(S1$)>2T
HEN1120
1140 PRINT@266,A$;
1150 LINEINPUTZ1$ :IF LEN(Z1$)>5T
HEN1140
1160 PRINT@480," ENTRY CORRECT (
Y)ES OR (R)EDO ";
1170 O$=INKEY$: IF O$="" THEN1170
1180 ON INSTR("RY",O$)GOTO 1200,
1210
1190 GOTO1160
1200 CLS:GOTO1020
1210 'UPDATE KEY ARRAY
1220 I=1
1230 IF N1$<KEY$(1) OR KEY(0)=0
THEN GOTO 1270
1240 IF N1$>KEY$(I)ANDKEY(0)=I T
HEN I=I+1:KEY(0)=KEY(0)+1:GOTO13
20
1250 IF N1$<KEY$(I)THEN1270
1260 I=I+1:GOTO1240
1270 KEY(0)=KEY(0)+1
1280 FOR J=KEY(0) TO I+1 STEP -1
1290 KEY$(J)=KEY$(J-1)
1300 KEY(J)=KEY(J-1)
1310 NEXT J
1320 KEY(I)=FA:KEY$(I)=N1$
1330 'NEXT AVAILABLE RECORD

```

```

1340 GET #2,FA:REC2=FA
1350 IF NA$="DELETED"THEN FA=VAL
(AD$)ELSE FA=FA+1
1360 LSET NA$=STR$(FA)
1370 LSET AD$="" :LSET CI$=""
1380 LSET ST$="" :LSET ZI$=""
1390 PUT #2,1
1400 'WRITE RECORD TO DISK
1410 LSET NA$=N1$
1420 LSET AD$=A1$ :LSET CI$=C1$
1430 LSET ST$=S1$ :LSET ZI$=Z1$
1440 PUT #2,REC2
1450 PRINT@480,"      ENTER MORE
DATA (Y/N)      ";
1460 O$=INKEY$:IF O$=""THEN 1460
1470 ON INSTR("YN",O$) GOTO 1020
,1490
1480 GOTO1450
1490 CLOSE #2:GOSUB11000:GOTO210
2000 'DELETE RECORDS
2010 CLS:PRINT@4,"RECORDS ON FIL
E = ";KEY(0)
2020 PRINT@101,"NAME":PRINT@160
,"1.ADDRESS:"
2030 PRINT@192,"2.    CITY":PRIN
T@224,"3. STATE:"
2040 PRINT@256,"4.    ZIP":PRIN
T@106,"";
2050 LINEINPUTV$
2060 I=1
2070 IF V$=KEY$(I) THEN 2110
2080 IF I>=KEY(0) THEN 2090 ELSE
I=I+1:GOTO2070
2090 PRINT@320,"NAME NOT FOUND"
2100 PRINT:INPUT"PRESS ENTER FOR
MENU";O$:GOTO210
2110 GOSUB12000
2120 GET #2,KEY(I)
2130 PRINT@106,NA$:PRINT@170,AD$
2140 PRINT@202,CI$:PRINT@234,ST$
2150 PRINT@266,ZI$
2160 PRINT@480,"      (D)ELETE OR
(E)XIT      ";
2170 O$=INKEY$:IF O$=""THEN 2170
2180 ON INSTR("ED",O$)GOTO2200,2
210
2190 GOTO 2160
2200 CLOSE #2:GOTO210
2210 GET #2,1:FA=VAL(NA$)
2220 LSET NA$=STR$(KEY(I)):PUT #
2,1
2230 LSET NA$="DELETED":LSET AD$=
STR$(FA)
2240 PUT #2,KEY(I):CLOSE #2
2250 FOR J=I TO KEY(0)-1

```

more

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```

2260 KEY(J)=KEY(J+1):KEY$(J)=KEY
$(J+1)
2270 NEXT J
2280 KEY(0)=KEY(0)-1
2290 GOSUB11000
2300 GOTO210
3000 'VIEW/EDIT RECORDS
3010 CLS:PRINT@4,"RECORDS ON FIL
E = ";KEY(0)
3020 PRINT@101,"NAME:";PRINT@160
,"1.ADDRESS:"
3030 PRINT@192,"2. CITY:";PRIN
T@224,"3. STATE:"
3040 PRINT@256,"4. ZIP:";PRIN
T@106,"";
3050 LINEINPUTV$
3060 I=1
3070 IF V$=KEY$(I) THEN 3110
3080 IF I>=KEY(0) THEN 3090 ELSE
I=I+1:GOTO3070
3090 PRINT@320,"NAME NOT FOUND"
3100 PRINT:INPUT"PRESS ENTER FOR
MENU";O$:GOTO210
3110 GOSUB12000
3120 GET #2,KEY(I)
3130 PRINT@106,NA$:PRINT@170,AD$
3140 PRINT@202,CI$:PRINT@234,ST$
3150 PRINT@266,ZI$
3160 PRINT@480," (E)DIT (N)EXT
(L)AST (M)ENU";
3170 O$=INKEY$:IF O$="" THEN3170
3180 ON INSTR("MENL",O$) GOTO 32
00,3210,3380,3400
3190 GOTO3160
3200 CLOSE #2:GOTO210
3210 PRINT@480," WHICH FIELD (1
-4) OR (E)XIT ";
3220 O$=INKEY$:IF O$="" THEN3220
3230 ON INSTR("E1234",O$) GOTO 3
250,3260,3290,3320,3350
3240 GOTO3210
3250 GOTO3160
3260 PRINT@170,A$;
3270 LINEINPUTA1$:IF LEN(A1$)>21
THEN3260
3280 LSET AD$=A1$:PUT #2,KEY(I):
GOTO3210
3290 PRINT@202,A$;
3300 LINEINPUTC1$:IF LEN(C1$)>16
THEN3290
3310 LSET CI$=C1$:PUT #2,KEY(I):
GOTO3210
3320 PRINT@234,A$;
3340 LSET ST$=S1$:PUT #2,KEY(I):

```

```

GOTO3210
3350 PRINT@266,A$;
3360 LINEINPUTZ1$:IF LEN(Z1$)>5T
HEN3350
3370 LSET ZI$=Z1$:PUT #2,KEY(I):
GOTO3210
3380 IF I=KEY(0) GOTO 3160
3390 I=I+1:GOTO3120
3400 IF I=1 GOTO 3160
3410 I=I-1:GOTO3120
4000 'PRINT RECORDS
4010 CLS:PRINT@4,"RECORDS ON FIL
E = ";KEY(0)
4020 PRINT@66,"PRINT ON (P)APER
OR (L)ABELS";
4030 O$=INKEY$:IF O$="" THEN4030
4040 ON INSTR("PL",O$) GOTO 4060
,4120
4050 GOTO4020
4060 PRINT@130,"READY PAPER - PR
ESS ENTER";:LINEINPUTX$
4070 GOSUB12000
4080 FOR I=1 TO KEY(0)
4090 GET #2,KEY(I)
4100 PRINT#-2,NA$;TAB(24);AD$;TA
B(50);CI$;TAB(68);ST$;TAB(72);ZI $
4110 NEXT I:CLOSE #2:GOTO210
4120 PRINT@130,"READY LABELS- PR
ESS ENTER";:LINEINPUTX$
4130 GOSUB12000
4140 FOR I=1 TO KEY(0)
4150 GET #2,KEY(I)
4160 PRINT#-2,NA$
4170 PRINT#-2,AD$
4180 PRINT#-2,CI$;TAB(19);ST$;TA
B(23);ZI$
4190 PRINT#-2,CHR$(10);CHR$(10)
4200 NEXTI:CLOSE#2:GOTO210
10000 'READ KEY ARRAY
10010 OPEN "I",#1,"MLKEY.FIL"
10020 INPUT #1,KEY(0)
10030 FOR I=1 TO KEY(0)
10040 INPUT #1,KEY(I),KEY$(I)
10050 NEXT I:CLOSE #1:RETURN
11000 'WRITE KEY ARRAY
11010 OPEN "O",#1,"MLKEY.FIL"
11020 PRINT #1,KEY(0)
11030 FOR I=1 TO KEY(0)
11040 PRINT #1,KEY(I);",",KEY$(I)
11050 NEXT I:CLOSE #1:RETURN
12000 'OPEN DATA FILE
12010 OPEN "D",#2,"MLIST.FIL",64
12020 FIELD #2,20 AS NA$,21 AS A
D$,16 AS CI$,2 AS ST$,5 AS ZI$
12030 RETURN
     ■■■

```

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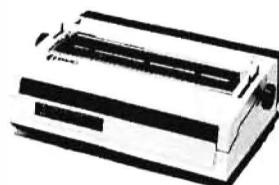
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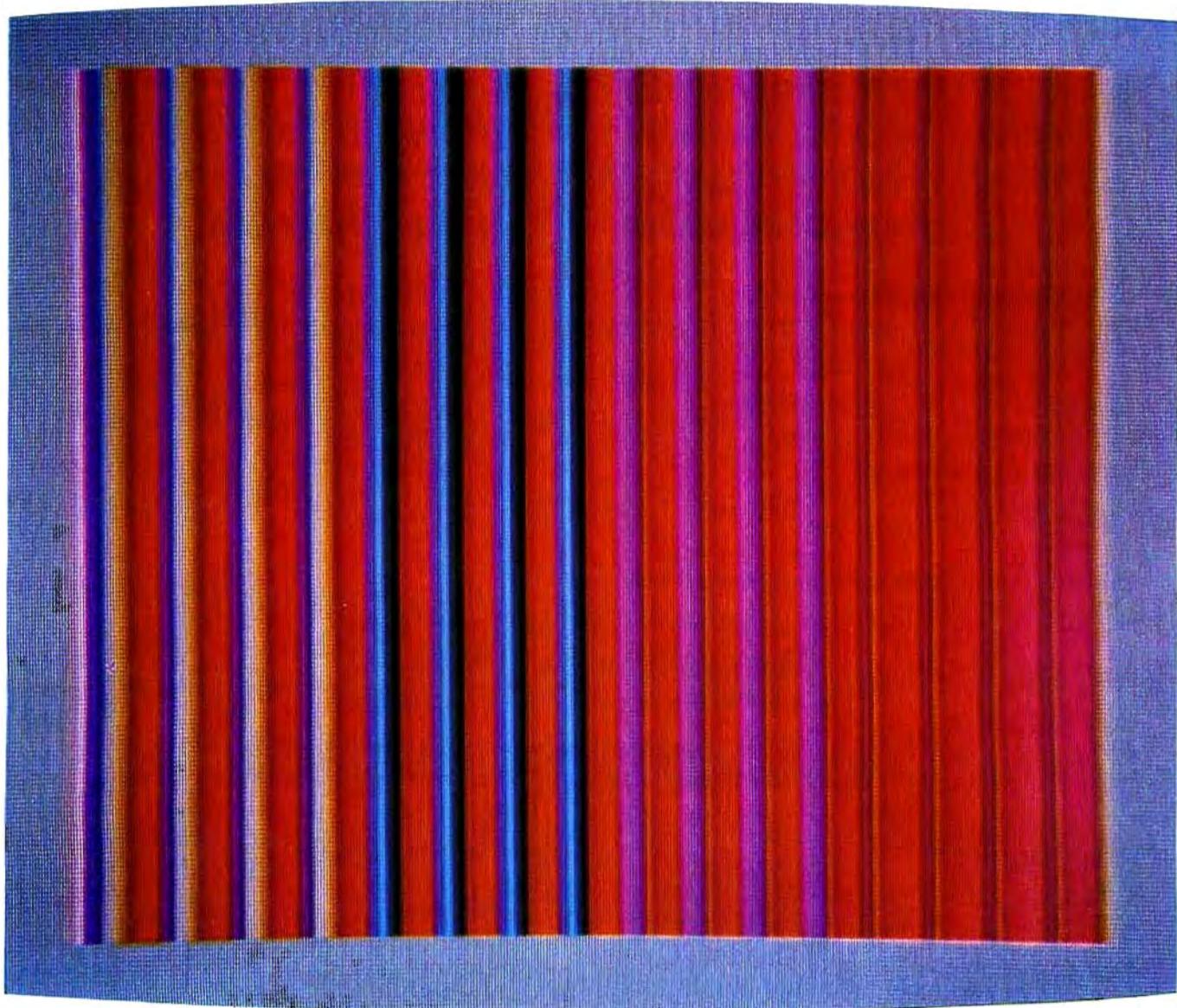
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View Utility



*This handy utility will help you use
mis-matched graphics modes for some
interesting and unusual results.*

by Jeff Rhodes

16K Color Basic



Optional

If YOU RELY on Extended Color Basic's PMODE statement to implement display modes, you are missing out on all the semographics modes, and the *hundreds* of mismatched display modes possible. View Utility is intended for all Color Computers; it is written in Color Basic but is compatible with Extended Color Basic and will properly configure for 16K or 32K.

The beginner will find View Utility to be a colorful learning aid, and the advanced program designer will use it to explore the bizarre video effects of mismatched modes.

Loading

View Utility (Program Listing 2) is a Basic program that calls machine language subroutines. The machine language subroutines must be loaded into memory prior to loading View Utility. Program Listing 1 is a Basic program that will load the machine code from the machine language subroutines. If you have an assembler, you can use Program Listing 3 to accomplish the same (remember to change the ORG to \$2739 for 16K). Regardless of your method, the machine code should begin at 10041 for 16K and 26425 for 32K.

There are three machine language subroutines — ML1, ML2 and ML3. ML1 generates the display modes, ML2 plots a demonstration, and ML3 is used to display binary values. If you want to simplify the set-up procedure, merge Program Listing 1 and Program Listing 2 (delete Line 10390). This will let you make only one CLOAD at the expense of using up most of the free RAM left in a 16K system.

First View Utility checks how much memory is available (16K or 32K). It then clears the last 6144 bytes for video RAM and saves 200 bytes for the machine language subroutines in reserved string space (which is why the POKEs and PEEKs to 36 and 37 are needed; otherwise, successive key entries will build down to eventually destroy the machine code). Lines 50090 to 50180 will assign the starting addresses for the three machine language subroutines, initialize some program variables, and POKE values that are needed by the demonstration subroutine into low RAM addresses 496 to 503.

Low RAM addresses 492, 493, 494 are used to pass variables between Basic and ML1. Low RAM 495, 504 and 505 are used by ML3. The program next checks to make sure the machine code is in the correct place and then jumps to the main portion of the program.



Photo 1. Text Page 1. Numeral 9 key always returns to this page.

The Program

You can have a lot of fun with View Utility by just pushing buttons, even if you don't understand this article. Another word of encouragement to beginners: there is absolutely no POKE, PEEK or any software program that can physically damage your computer. No doubt you will crash (a temporary loss of control) at times, but Resetting or turning the machine off will always make things good again.

The main program consists of three text pages and a view screen. Program control keys are 9, Spacebar and Enter. The numeral 9 key will always send you to text page 1. Spacebar will always send you to text page 2 unless you are already at page 2, in which case you are sent to the view screen. Enter will either send you to page 3 or generate a three-second view of predetermined parameter values. Enter is also used to plot and invoke the demonstration.

Learning About View

The following steps are recommended to become familiar with View Utility:

1. If you choose to type in Program Listing 1 and Listing 2 as one program,

skip to step 2. Otherwise, you will need to first load the machine code and then load Program Listing 2. If you use Program Listing 1 to load the machine code, don't forget to Run this program. You will be given a prompt: MACHINE CODE LOADED AT 10041 on a 16K system. If you use Program Listing 3, don't forget to assemble.

2. Load and run View Utility. Check each of the screens with the corresponding screen picture as we walk through the program features.

3. Assuming there are no program errors in your listing, View Utility will present text page 1 (Photo 1). Should you get lost during this walk-through, use the 9 key to return to this point.

4. Press Enter twice. The first Enter sends you to text page 3 (Photo 2), and the second Enter invokes the demonstration view for three seconds (Photo 3). If you continue to press Enter, you will generate successive three-second views of the demo view.

5. For a longer view of the demo, press the Spacebar twice. The first Spacebar sends you to text page 2 (Photo 4). The parameter values that appear on this page are used by the demo. The second press of the Spacebar toggles to the view screen, which at this point should display the demo. Be careful here: almost every key will change the display in different ways. Pressing 4 will change the parameter values from the demo's Semigraphic 24 to parameter values that correspond to Semographics 12. Press Spacebar to toggle to page 2 and you will see that the VDG mode is now 4. Toggle back to the view.

6. Since Semigraphic 12 uses only 3072 bytes, and since the start of video RAM is unchanged, the current view displayed is generated by the top half of the demo data bytes. Press Enter for a three-second return to the full demo.

7. For a three-frame sequence (which can be used to previsualize animation ef-

• more

Matched Values for Normal Displays

VDG	CSS	DISPLAY MODE	PMODE
0	0	SG 4/TEXT	—
0	16/24	SG 6	—
2	0	SG 8	—
4	0	SG 12	—
6	0	SG 24	—
1	128/136	G1C	—
1	144/152	G1R	—
2	160/168	G2C	—
3	176/184	G2R	0
4	192/200	G3C	1
5	208/216	G3R	2
6	224/232	G6C	3
6	240/248	G6R	4

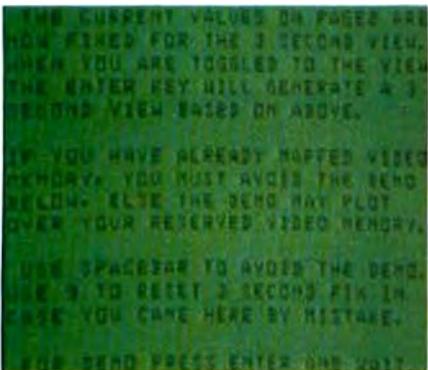


Photo 2A. Text Page 3 Before Demo View

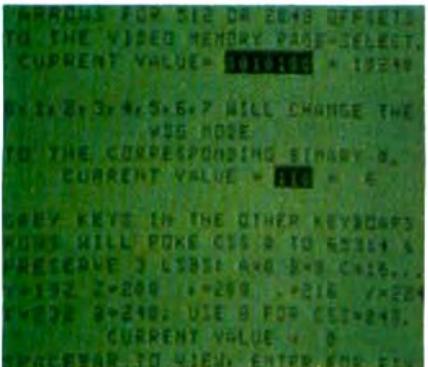


Photo 2B. Text Page 3 After Demo View

fects) try this while at the view: press 4, then Enter and then, within three seconds, press 2.

8. A common ploy for determining adventure game keywords is to look for text embedded in the program. View Utility can be used for this: while at the view, press 0 (zero) and then A to guarantee that you are in the normal text mode (VDG is zero, control select or CSS value is also zero). Press the Down Arrow a few times, or at least until you recognize the View Utility text. You can always toggle to page 2 to check where you are in memory.

9. If you try to walk past the zero address, the program will crash. Reset and Run should get you back to page 1. Otherwise you will need to turn the computer off and begin at step 1.

10. If you haven't crashed, use the Up Arrow to walk back to the demo. The Left Arrow will cause each step to be 2048 bytes. The easiest and surest way to get back to the demo is to replot it — toggle to page 2, press Enter twice and toggle back to the view.

11. Press keys at random; there is a plethora of display modes.

Incidentally, if it occurs to you that Semigraphics 24 (or 8 or 12) can be used to generate eight-color bar graphs with text, you are absolutely right. Semigraphics 24 also offers the same vertical resolution as PMODE 4.

Where To Use It

To put View Utility to work, you need to be acquainted with other program features:

- The View Utility listing begins at 50000 to facilitate merging. 32K Extended Color Basic users have the biggest advantage; these users can use Extended Color Basic statements in a program to generate a user screen. This program can be merged with View Utility, which can manipulate the user's screen, to achieve a certain video effect. The parameters necessary for generating the desired video effect can be incorporated in the user program.

- The demo view can be avoided so you can plot your own display in the reserved video RAM.

- The parameter values for the three-second view can be altered. Each time text page 3 is entered, the values that appear on page 2 become the new three-second values. To fix these values you must go to text page 2 directly. Needless to say, if you press Enter while on text page 3, the demo is plotted and the parameter values needed by the demo are superimposed. A further program feature: should you inadvertently end up on page 3 and do not wish to change the three-second values, you can reset to the last previous values by going directly to page 1 (press 9). When you fix or reset values, a three-second view will confirm the current values on the way to page 1 or page 2.

To generate a desired non-standard video effect, it is helpful to have a solid understanding of the standard displays. See the Table for the matched values of standard displays. Keep in mind that in general the VDG value determines how the memory is addressed (memory position vs. screen position) and the CSS value determines how the bytes are displayed (alpha, color, resolution, etc).

VDG Mode 7 is undocumented by Radio Shack and Motorola, so my best advice is to avoid its use in commercially destined programs. For further information concerning the bizarre video effects of the mismatched modes, refer to Computerware's instruction manual for "Foxy Graf," which I ordered separately for about \$16. I have never seen the "Foxy Graf" program, but based on what I've read, it sounds like a very good graphics generator.

View Utility preserves the three least significant bits at 65314. I doubt that this practice is necessary. 65314 points to a P.I.A. that is programmed by Basic's start-up routine. The three least significant bits of 65314 are programmed as input to the CPU, which means the CPU

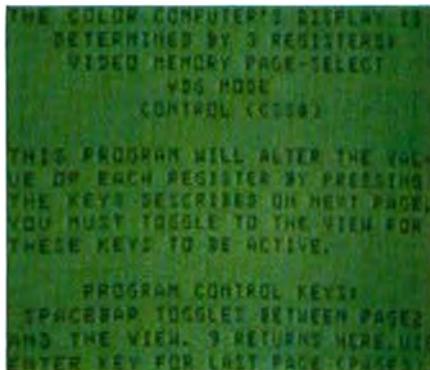


Photo 3. Demonstration View

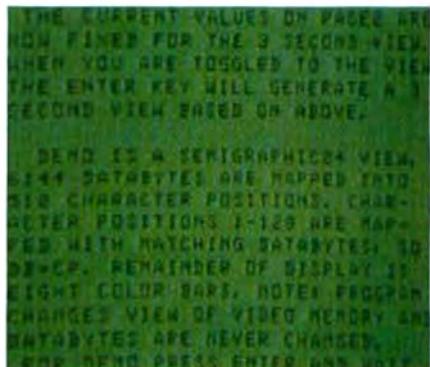


Photo 4. Text Page 2. Inverse video numbers are generated by subroutine ML3.

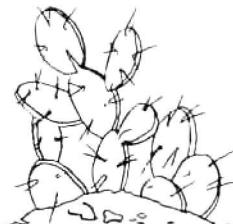
can never directly write anything there. Try this: POKE 65314,O:A=PEEK(65314):PRINTA. You can't change the three least significant bits at 65314 even if you want to.

One other short cut: it is only necessary to POKE the changes for the odd and even addresses between 65472 to 65491. When you start up in the normal text mode, the values are:

1576 = Start of VIDRAM = 0000010
0 = VDG Mode = 000.

To go from these values to VDG Mode 6 at VIDRAM beginning at 9216: POKE 65477,1:POKE 65475,1:POKE 65487,1. It only takes three POKEs to get back to the normal text mode, as well: POKE 65476,0:POKE 65474,0:POKE 65486,0. It doesn't matter what number you use when POKEing — any integer between 0 to 255 is syntactically correct. I use 0 and 1 to remind me what I'm doing with the POKE. By the way, the binary values on page 2 of View Utility are given to help you determine which of the addresses between 65472 and 65491 need to be POKEd for a given display mode and page.

One of the reasons I chose the Color Computer over the Apple II is that the Color Computer offers a variety of display modes, as opposed to the Apple II's dual hi-res and lo-res modes. I hope other programmers will use View Utility to exploit this inherent capability and advantage of the Color Computer. ■ ■ ■



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The most complex simulation we have ever seen, and you VIKING! fans will want to take note. This game has you running a small holding in old Ireland. You must manage your land, sheep, army, markets, fishing fleets, taxes, and many other factors while you try to rise in rank to become King or Queen. You may attack — or be attacked — by the other players, and you will have to face the fact that there isn't enough land to go around, and you may have to take some away from someone else! This 32K game is considerably more complex and difficult than our super popular VIKING! Because of this, we have added a save-the-game feature. ERLAND is for 2 to 5 game lovers, and will warm the heart of anyone who liked VIKING!, Monopoly, or other classic strategy games. This game is a hybrid of Extended Basic and Machine language. The disk and tape versions are not interchangeable. **Tape — \$24.95; Disk — \$29.95**



Satellite Tracker



Satellite Tracker

If you are interested in reception of transmissions from the television satellites, you will need this program. It does all calculations associated with planning and setting up a satellite dish antenna. It figures antenna gain, signal to noise, aiming point for any geosynchronous satellite, effect of various quality amplifiers, and a lot more. The program will tell you whether a dish is practical in your location, how big it needs to be, and what kind of picture quality and signal strength you will achieve. If you are thinking of investing in a system, don't make a move until the results are in. Requires 32K extended BASIC and some (limited) knowledge of satellite terms and language. **\$79.95**

Dealer and author inquiries are always welcome. Canadian dealers should contact Kelly Software Distributors, Ltd., P. O. Box 11932, Edmonton, Alberta T5J-3L1 (403) 421-8003

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Program Listing 1. Machine Code Loader

```

999 REM MACHINE LANGUAGE
      SUBROUTINES FOR VIEW UTILITY
10000 A=PEEK(116):F=PEEK(117)
10010 RAMEND=256*A+F
10020 CKSUM=0
10030 FOR I = RAMEND-6341 TO
      RAMEND-6167
10040 READ A
10050 POKE I,A
10060 CKSUM = CKSUM + A
10070 NEXT I
10080 IF CKSUM = 19473 THEN
      PRINT "MACHINE CODE LOADED AT ";
      RAMEND-6341 ELSE PRINT "ERROR IN
      DATA LINES"
10090 DATA 182,1,236,68,198,7
10100 DATA 142,255,198,68,37,4
10110 DATA 167,129,32,4,48,1
10120 DATA 167,128,90,38,242
10130 DATA 182,1,237,198,3,142
10140 DATA 255,192,68,37,4,167
10150 DATA 129,32,4,48,1,167
10160 DATA 128,90,38,242,182
10170 DATA 255,34,132,7,52,2,182

10180 DATA 1,238,132,248,170,224
10190 DATA 183,255,34,57,190,1
10200 DATA 240,31,18,198,32,30
10210 DATA 18,58,31,18,79,167
10220 DATA 128,76,39,11,90,38
10230 DATA 248,48,137,1,96,198
10240 DATA 32,32,240,188,1,242
10250 DATA 38,227,134,127,48
10260 DATA 137,249,255,49,4,139
10270 DATA 16,198,4,167,133,90
10280 DATA 38,251,48,136,32,188
10290 DATA 1,246,43,241,31,33
10300 DATA 188,1,244,38,230,57
10310 DATA 142,4,80,191,1,248
10320 DATA 48,7,182,1,236,70
10330 DATA 189,103,213,142,4
10340 DATA 244,191,1,248,48,3
10350 DATA 182,1,237,183,1,239
10360 DATA 118,1,239,134,0,73
10370 DATA 139,48,167,130,188
10380 DATA 1,248,38,241,57
10390 END

```

Program Listing 2. View Utility

```

50000 'THE VIEW UTILITY PROGRAM
      GIVEN TO THE PUBLIC DOMAIN
      BY JEFF RHODES
50010 REM CALCULATE MEMORY SIZE
50020 A=PEEK(116):F=PEEK(117)
50030 RAMEND=256*A+F
50040 REM CONFIGURE VIDEO RAM
50050 CLEAR 200, RAMEND-6144
      :REM 16K EXTENDED COLOR
      BASIC REQUIRES A PCLEAR1
      ELSE YOU'LL GET ?OM ERROR
50060 A=PEEK(116):F=PEEK(117)
50070 RAMEND=256*A+F
50080 REM INITIAL VALUES
50090 ML(1)=RAMEND-6341
50100 ML(2)=RAMEND-6278
50110 ML(3)=RAMEND-6211
50120 PS(0)=(RAMEND-6142)/256
      :PS(1)=PS(0)
50130 VD(0)=6:VD(1)=6
50140 A=INT((RAMEND-6174)/256)
50150 POKE 496,A:POKE 497,224
      :REM ML2 STRTVW
50160 POKE 498,A+13:POKE 499,0
      :REM ML2 STOPVW
50170 POKE 500,A+7:POKE 501,31
      :REM ML2 BARSTP
50180 POKE 502,A+25:POKE 503,0
      :REM ML2 DONEVW
50190 A=PEEK(ML(1)): PRINT "MUST
      LOAD ML SUBROUTINES": IF A=
      182 THEN 51000 ELSE 50190
50200 REM MAIN PROG SUBROUTINES
50210 REM VIEW INKEY$ SUBRTE
50220 EXEC ML(1)
50230 S(0)=PEEK(35)
50240 S(1)=PEEK(36)
50250 A$=INKEY$:IFA$=""THEN50250
      ELSE A=ASC(A$)
50260 POKE 35,S(0):POKE 36,S(1)
50270 IF A=32THEN F=2:GOSUB50810
      :RETURN
50280 IF A=13 THEN GOSUB 50660
      :GOSUB 50750
50290 IF A=57THEN F=1:GOSUB50810
      :RETURN
50300 IF A>47 AND A<56 THEN POKE
      493,A-48
50310 IF A>64 AND A<91 THEN POKE
      494,(A-65)*8
50320 IF A=44 THEN POKE 494,208
      :more

```

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50330 IF A=46 OR A=47 THEN POKE
  494,216+8*(A-46)
50340 IF A=64 THEN POKE 494,240
50350 IF A=59 THEN POKE 494,232
50360 IF A=56 THEN POKE 494,248
50370 IF A=8 THEN F = PEEK(492)
  :POKE 492,F+8

50380 IF A=9 THEN F = PEEK(492)
  :POKE 492,F-8
50390 IF A=10 THEN F = PEEK(492)
  :POKE 492,F-2
50400 IF A=94 THEN F = PEEK(492)
  :POKE 492,F+2
50410 IF A<8 OR A=11 OR A=12 OR A>13
  AND A<32 OR A>32 AND A<44 OR A=45
  OR A=58 OR A>59 AND A<64 OR A>90
  AND A<94 OR A>95 THEN GOSUB 50440
  ELSE 50220
50420 RETURN
50430 REM BADKEY SUBRTE
  ENTER HERE FROM VIEW
50440 GOSUB 50810
50450 CLS
50460 PRINT "YOU PRESSED A KEY TH
AT IS NOT"
50470 PRINT "USED IN THIS PROGRAM
":GOTO 50500
50480 REM NORMAL BADKEY ENTRY
50490 CLS :PRINT "SORRY, USE ONE O
F THE KEYS BELOW"
50500 PRINTTAB(8)"USE 9 FOR PAGE
1"
50510 PRINTTAB(8)"USE SPACEBAR F
OR PAGE2"
50520 PRINTTAB(8)"USE ENTER KEY
FOR PAGE3"
50530 REM INKEYS SUBROUTINE
50540 S(0)=PEEK(35)
50550 S(1)=PEEK(36)
50560 A$=INKEY$:IFA$=""THEN 50560
  ELSE F=ASC(A$)
50570 POKE 35,S(0):POKE 36,S(1)
50580 IF F=57 THEN F=1
50590 IF F=32 THEN F=2
50600 IF F=13 THEN F=3
50610 IF F>3 AND A=255 THEN
  RETURN
50620 A=255
50630 IF F > 3 THEN GOSUB 50490
  :GOTO 50630
50640 A=155:RETURN
  :REM EXIT INKEY$ SUBROUTINES
50650 REM FIX PAGE2 VALUES FOR 3
  SECOND VIEW SUBRTE
50660 PS(0)=PEEK(492):VD(0)=PEEK
  (493):CS(0)=PEEK(494)

50670 RETURN
50680 REM UNFIX SUBRTE
50690 PS(0)=PS(1):VD(0)=VD(1):CS
  (0)=CS(1)
50700 RETURN
50710 REM 3 SEC VIEW SUBRTE
50720 REM ENTRY FROM PG3 FIX
50730 PS(1)=PS(0):VD(1)=VD(0):CS
  (1)=CS(0)
50740 REM ENTRY FROM ALL OTHERS
50750 POKE 492,PS(1):POKE 493,VD
  (1):POKE 494,CS(1)
50760 EXEC ML(1)
50770 FOR I=1 TO 600:NEXT I
50780 IF A=13 THEN GOSUB 50920
  :RETURN
50790 REM IF NOT RETURNING TO
  VIEW, MUST RESTORE NORMAL
  TEXT MODE
50800 REM ENTER HERE FROM VIEW
50810 FOR I=65472 TO 65490 STEP 2
50820 POKE I,0:NEXT I
50830 POKE 65481,1
50840 A=PEEK(65314):POKE 65314,0
  OR (A AND 7)
50850 RETURN
50860 REM DEMO VIDEO MEMORY PLOT

50870 EXEC ML(2)
50880 PS(1)=(RAMEND-6142)/256:VD
  (1)=6:CS(1)=0
50890 GOSUB 50750
50900 RETURN
50910 REM RESTORE PRIOR VALUES
  WHEN RETURNING AFTER 3 SEC VIEW
50920 POKE 492,PS(0):POKE 493,VD
  (0):POKE 494,CS(0)
50930 RETURN
50940 REM MAIN PROG BEGINS@51000

51000 CLS
51010 PRINT @0,"THE COLOR COMPUTE
R'S DISPLAY IS"
51020 PRINT @35,"DETERMINED BY 3
REGISTERS:"
51030 PRINT @68,"VIDEO MEMORY PAG
E-SELECT"
51040 PRINT @107,"VDG MODE"
51050 PRINT @137,"CONTROL (CSS#)"

51060 PRINT @192,"THIS PROGRAM WI
LL ALTER THE VAL-"
51070 PRINT @224,"UE OF EACH REGI
STER BY PRESSING"
51080 PRINT @256,"THE KEYS DESCRI
BED ON NEXT PAGE."

```

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```

51090 PRINT@288,"YOU MUST TOGGLE
TO THE VIEW FOR"
51100 PRINT@320,"THESE KEYS TO B
E ACTIVE."
51110 PRINT@389,"PROGRAM CONTROL
KEYS:"

51120 PRINT@417,"SPACEBAR TOGGLE
S BETWEEN PAGE2"
51130 PRINT@448,"AND THE VIEW. 9
RETURNS HERE.USE";
51140 PRINT@480,"ENTER KEY FOR L
AST PAGE (PAGE3)";
51150 GOSUB 50540
51160 ON F GOTO51000,51170,51410

51170 CLS
51180 PRINT@1,"ARROWS FOR 512 OR
2048 OFFSETS"
51190 PRINT@32,"TO THE VIDEO MEM
ORY PAGE-SELECT."
51200 PRINT@65,"CURRENT VALUE=";

51210 PRINT@88,"= ";
51220 F=PEEK(492):PRINT@89,256*F

51230 PRINT@128,"0,1,2,3,4,5,6,7
WILL CHANGE THE"
51240 PRINT@170,"VDG MODE"
51250 PRINT@192,"TO THE CORRESPON
DING BINARY #."
51260 PRINT@228,"CURRENT VALUE =
"
51270 PRINT@248,"= "
51280 F=PEEK(493):PRINT@250,F
51290 PRINT@288,"GREY KEYS IN TH
E OTHER KEYBOARD"
51300 PRINT@320,"ROWS WILL POKE
CSS # TO 65314 &"
51310 PRINT@352,"PRESERVE 3 LSBS
: A=0 B=8 C=16 . . ."
51320 PRINT@384,"Y=192 Z=200 ,=
208 .=216 /=224"
51330 PRINT@416,";=232 @=240. US
E 8 FOR CSS=248."
51340 PRINT@455,"CURRENT VALUE =
";
51350 F=PEEK(494):PRINT@471,F
51360 PRINT@480,"SPACEBAR TO VIE
W, ENTER FOR FIX";
51370 EXEC ML(3)
51380 GOSUB 50540
51390 ON F GOTO51000,51400,51410

51400 GOSUB50220:ON F GOTO51000,
51170

```

```

51410 CLS:GOSUB 50660
51420 PRINT@1,"THE CURRENT VALUE
S ON PAGE2 ARE"
51430 PRINT@32,"NOW FIXED FOR TH
E 3 SECOND VIEW."
51440 PRINT@64,"WHEN YOU ARE TOG
GLED TO THE VIEW"
51450 PRINT@96,"THE ENTER KEY WI
LL GENERATE A 3"
51460 PRINT@128,"SECOND VIEW BAS
ED ON ABOVE."
51470 PRINT@192,"IF YOU HAVE ALR
EADY MAPPED VIDEO"
51480 PRINT@224,"MEMORY, YOU MUS
T AVOID THE DEMO"
51490 PRINT@256,"BELOW, ELSE THE
DEMO MAY PLOT"
51500 PRINT@288,"OVER YOUR RESER
VED VIDEO MEMORY."
51510 PRINT@353,"USE SPACEBAR TO
AVOID THE DEMO."
51520 PRINT@384,"USE 9 TO RESET
3 SECOND FIX IN"
51530 PRINT@416,"CASE YOU CAME H
ERE BY MISTAKE."
51540 PRINT@481,"FOR DEMO PRESS
ENTER AND WAIT.";
51550 GOSUB 50540
51560 IF F=1 THEN GOSUB 50690
:GOSUB 50750:GOTO 51000
51570 IF F=2 THEN GOSUB 50730
:GOTO 51170
51580 IF F=3 THEN A = 155
:GOSUB 50870
51590 PRINT@192," DEMO IS A SEM
IGRAPHIC24 VIEW."
51600 PRINT@224,"6144 DATABYTES
ARE MAPPED INTO"
51610 PRINT@256,"512 CHARACTER P
OSITIONS. CHAR--"
51620 PRINT@288,"ACTER POSITIONS
1-128 ARE MAP--"
51630 PRINT@320,"PED WITH MATCHI
NG DATABYTES, SO"
51640 PRINT@352,"DB=CP. REMAINDE
R OF DISPLAY IS"
51650 PRINT@384,"EIGHT COLOR BAR
S. NOTE: PROGRAM"
51660 PRINT@416,"CHANGES VIEW OF
VIDEO MEMORY AND"
51670 PRINT@448,"DATABYTES ARE N
EVER CHANGED.";
51680 GOSUB 50540
51690 IF F=3 THEN GOTO 51580
51700 ON F GOTO 51000,51170

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THE Color Computer MAGAZINE

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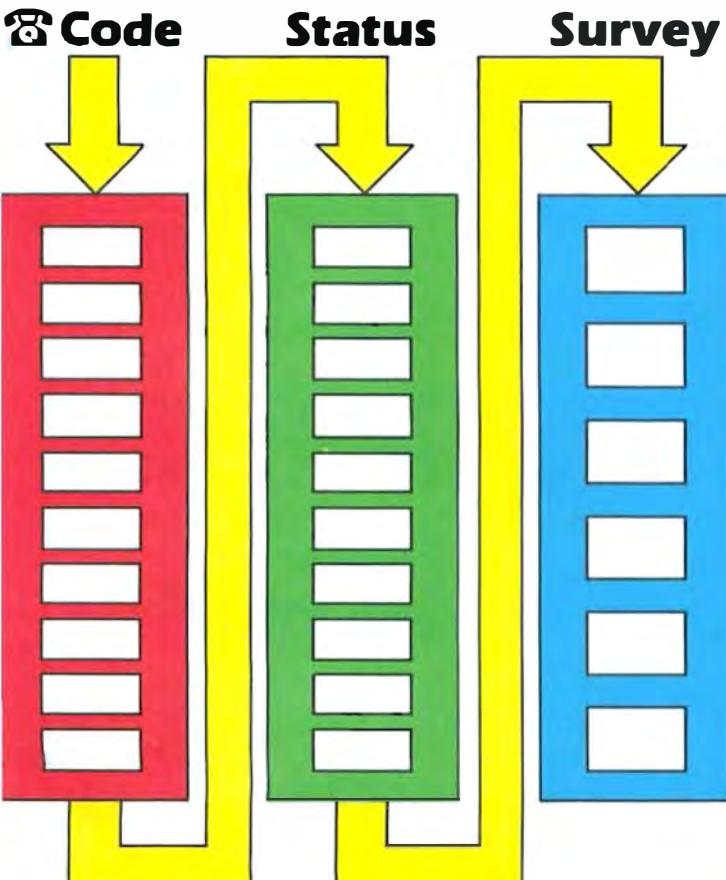
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This is Issue #10-02



Reader Survey

- A. What is your present system's memory capacity?
1. 64K 2. 32K 3. 16K 4. 4K
- B. Is your system configured for:
1. Color Basic
2. Extended Color Basic
3. OS/9
4. Basic 09?
- C. Do you own:
1. Disk drives 2. Printer
3. Modem 4. Joysticks 5. Multi-pak interface
6. Plotter 7. Light pen?
- D. What do you plan to buy during the next six months?
1. More memory 2. Upgraded ROM 3. Printer
4. Modem 5. Disk drives 6. Multi-pak interface
- E. What do you use your computer for?
1. Adult learning tool 2. Child's learning tool
3. Small business or home management
4. Games 5. Programming
- F. In reading **The Color Computer Magazine**, what are your major editorial interests?
1. Educational programs
2. Home management and small business applications
3. Hardware projects 4. Games
5. Telecommunications 6. Peripheral information

Program Listing 3. Machine Code for Assemblers

01EF	00100	TEMP	EQU	495	6791	C6	20	00640	LDB	#32
01EC	00110	PAGE	EQU	492	6793	20	F0	00650	BRA	LOOP8
01ED	00120	VDG	EQU	493	6795	BC	01F2	00660	TEST	CMPX STOPVW
01EE	00130	CSS	EQU	494	6798	26	E3	00670	BNE	LOOP7
01F0	00140	STRTVW	EQU	496	679A	86	7F	00680	BARS	LDA #\$7F
01F2	00150	STOPVW	EQU	498	679C	30	89 F9FF	00690	LEAX	-1537,X
01F4	00160	BARSTP	EQU	500	67A0	31	04	00700	LOOP9	LEAY 4,X
01F6	00170	DONEVW	EQU	502	67A2	8B	10	00710	ADDA	#\$10
01F8	00180	TEMP2	EQU	504	67A4	C6	04	00720	LOOP10	LDB #4
6739		00190	ORG	\$6739	67A6	A7	85	00730	LOOP11	STA B,X
6739	B6	01EC	00200	ML1	LDA	PAGE		00740	DEC B	
673C	44		00210	PGCHG	LSRA			00750	BNE	LOOP11
673D	C6	07	00220		LDB	#7		00760	LEAX	32,X
673F	8E	FFC6	00230		LDX	#\$FFC6		00770	CMPX	DONEVW
6742	44		00240	LOOP1	LSRA			00780	BMI	LOOP10
6743	25	04	00250		BCS	LOOP2		00790	TFR	Y,X
6745	A7	81	00260		STA	,X++		00800	CMPX	BARSTP
6747	20	04	00270		BRA	LOOP3		00810	BNE	LOOP9
6749	30	01	00280	LOOP2	LEAX	1,X		00820	RTS	
674B	A7	80	00290		STA	,X+		00830	ML3	LDX #1104
674D	5A		00300	LOOP3	DEC B			00840	STX	TEMP2
674E	26	F2	00310		BNE	LOOP1		00850	LEAX	7,X
6750	B6	01ED	00320	VDGCHG	LDA	VDG		00860	LDA	PAGE
6753	C6	03	00330		LDB	#3		00870	RORA	
6755	8E	FFC0	00340		LDX	#\$FFC0		00880	JSR	ROTATE
6758	44		00350	LOOP4	LSRA			00890	LDX	#1268
6759	25	04	00360		BCS	LOOP5		00900	STX	TEMP2
675B	A7	81	00370		STA	,X++		00910	LEAX	3,X
675D	20	04	00380		BRA	LOOP6		00920	LDA	VDG
675F	30	01	00390	LOOP5	LEAX	1,X		00930	ROTATE	STA TEMP
6761	A7	80	00400		STA	,X+		00940	LOOP12	ROR TEMP
6763	5A		00410	LOOP6	DEC B			00950	LDA	#0
6764	26	F2	00420		BNE	LOOP4		00960	ROLA	
6766	B6	FF22	00430	CSSCHG	LDA	\$FF22		00970	ADDA	#48
6769	84	07	00440		AND A	#7		00980	STA	,-X
676B	34	02	00450		PSHS	A		00990	CMPX	TEMP2
676D	B6	01EE	00460		LDA	CSS		01000	BNE	LOOP12
6770	84	F8	00470		AND A	#\$F8		01010	RTS	
6772	AA	E0	00480		ORA	,S+		01020	END	
6774	B7	FF22	00490		STA	\$FF22	0000	00000		
6777	39		00500		RTS		00000 TOTAL ERRORS			

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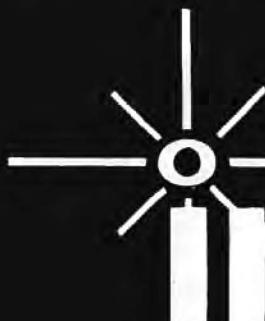
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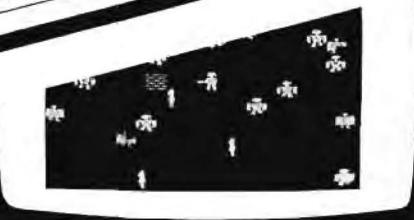
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Atari Joystick Adapter

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The Adapted Joystick

MANY ARCADE GAMES modified for the Color Computer were originally designed for Atari-style joysticks. The games aren't quite the same without them. Fortunately, the flexibility of the Color Computer's joystick ports makes it easy to adapt Atari joysticks to the Color Computer. Here's a method that uses a \$1.00 integrated circuit (IC) and eight resistors, requires no modifications to the computer or the joysticks, and even lets you rotate the sticks for left-handed operation.

How They Work

Atari joysticks contain five switches: the fire button and four switches that sense the direction the "stick" is pushed. All are connected on one side to ground (line G in Figure 1), and are normally open. A joystick switch is closed when the stick is moved. Thus, pushing the fire button closes the F switch; the computer senses that the F line has been connected to ground, and launches a doomsday missile. The other four lines indicate left (line A), right (B), up (D), and down (C). Pushing the stick left and up causes switches A and D to close. The stick is self-centering — take your hands away and all switches open.

A Color Computer joystick port is actually two analog-to-digital converters, one for the X (horizontal) direction and one for the Y (vertical) direction. The fire button works just like Atari's. The X and Y converters accept a voltage from zero to five volts, and convert it to a number from zero to 63. The ports supply five

volts to the joysticks, which divide it down to some intermediate voltage depending on the position of the stick. For example, if the right joystick is centered in the horizontal direction, the five volts would be divided in half, and 2.5 volts would be returned to the X input. The Basic function JOYSTK(0) would return a value of 31.

An arcade-style game reduces the Color Computer's subtlety to the Atari-like crudity it requires, by interpreting any joystick value less than 12 as left, any value above 50 as right, and everything in-between as centered. This leaves a large dead space in the middle, making it tough to change directions in a hurry. Also, the Color Computer joysticks aren't self-centering, so you might find yourself traveling in a direction you never intended. All this makes a game even more frustrating than it was intended to be.

The solution is to use Atari joysticks, and translate the Atari's crude switch closures into the civilized voltages of the Color Computer. The X voltage should be zero when joystick switch A is closed, about 2.5 volts when neither A nor B is closed, and five volts when B is closed.

The Circuit

My translator is diagrammed in Figure 2. Connections to the Atari joysticks are drawn as circles, and connections to the Color Computer port are drawn as triangles. The IC is a 4066-quad bilateral switch. The 4066 contains four solid-state switches, each of which can be connected to any voltage you desire, not just ground. An IC switch is open when its control line is at ground, closed when its control line is at five volts.

To see how the circuit works, consider just the A and B switches and horizontal motion. Control lines A and B are connected to five volts through resistors, so IC switches A and B are normally closed. The X output is then connected, through equal resistors, to five volts by IC switch A, and to zero volts by IC switch B. The voltage at X is the average, 2.5 volts.

The A control line is connected to the A switch on the joystick. When the stick is pushed left, the A joystick switch closes, shorting the A control line to ground, and opening IC switch A. Now the X output is connected only to zero volts, just what you want for left movement. Similarly, if the stick is pushed right, the B line is grounded, and X is connected only to five volts — right. The Y output works the same way, except that zero volts means up and five volts means down.

by Robert Lee Hawkins

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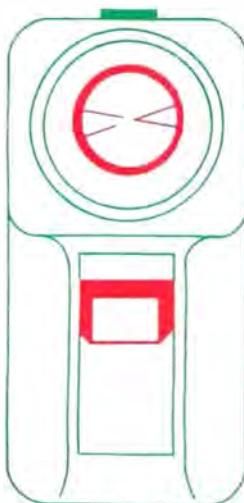
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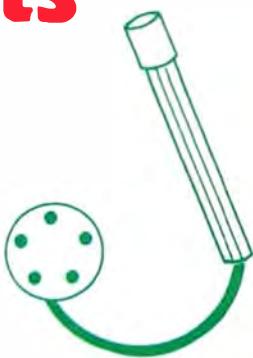
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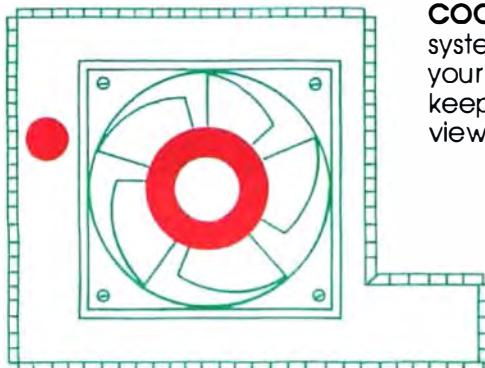
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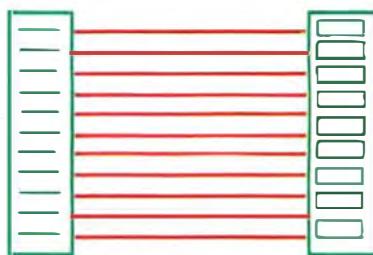
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Build It

The circuit can be constructed using any technique. Use a 14-pin socket to hold the 4066, and take reasonable precautions against static electricity when handling it. You may want to build two circuits on one circuit board, for the left and right joystick ports. The pre-etched circuit boards in the parts list have enough room for this.

I used 100k-ohm resistors in the prototype because they were cluttering up my junkbox, but any value from 10k to 100k will work fine. It's only important that the two resistors attached to IC switches A and B be the same, and that the two attached to C and D be the same. In fact, I only had seven 100K resistors, so I used an 82K part on the D control line.

The circuit isn't much use until you can plug an Atari joystick in one end and a Color Computer in the other. For the Atari end, you need a standard DB-9 plug. Figure 1 gives a solderer's-eye view of the solder pins on the back of the plug. If you're left-handed, you may want to rotate the joystick so the fire button is in the upper right corner, rather than the upper left. In that case, change the wiring to the DB-9 as follows: A becomes D, D becomes B, B becomes C, and C becomes A.



Close-up of the Circuit.

It has been widely and incorrectly reported that the Color Computer joystick ports take a "standard five-pin DIN plug." In fact, the five-pin DIN plugs that Radio Shack sells won't fit. What you really need is a six-pin DIN plug; the sixth center pin is wasted. Some manufacturers leave the center pin off and call the result a "270 degree five-pin DIN plug." Be sure to get thinline plugs that will fit into the narrow hole in the Color Computer's case. Even so, you may have to cut the plastic shell short to get a reliable connection. If you're really cheap, you can make your own plug using 16-gauge solid wire for pins.

Now the circuit's assembled and ready to be tested. You can't use an inexpensive multimeter, because the multimeter's resistance will be less than the resistances used in the circuit. A vacuum-tube or FET multimeter will give accurate voltages. Better yet, just plug the circuit into your right joystick port. It can't damage your computer, because the computer is its only source of power.

To test the fire button, enter the following line: FOR I=1 TO 2 STEP 0 : PRINT PEEK(65280) : NEXT I. A column of numbers will flow up your screen. As long as the numbers change when you press the fire button, it's working. To test the joystick itself, enter: FOR I=1 TO 2 STEP 0 : PRIN-

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JOYSTK(0), JOYSTK(1) : NEXTI. Two columns of numbers will flow up your screen, the first being the X joystick value, the second the Y value. When the stick is centered, both should be about 31 (resistor variations might cause a variation of a

few counts). Push the stick left and the first number only should change (to zero); push right and it should change to 63. The second number should be zero when the stick is pushed up, 63 when it's pushed down. The 4066 can handle

about ten million changes of direction per second, which should be adequate even for championship play.

The final step is to load in one of those arcade games and start playing it the way it was meant to be played! ■ ■ ■

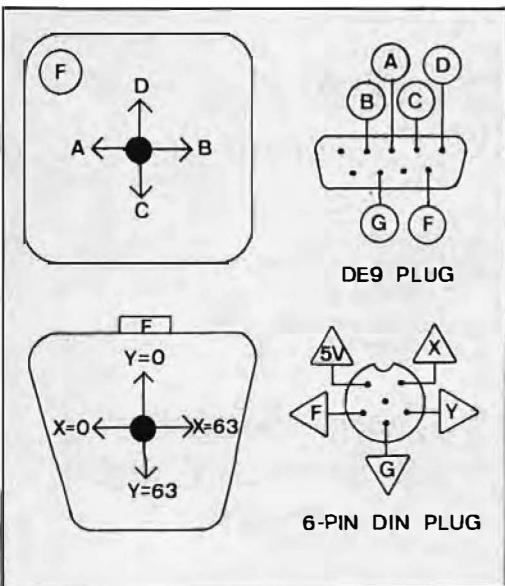


Figure 1. Atari (top) and Color Computer (bottom) joystick connections.

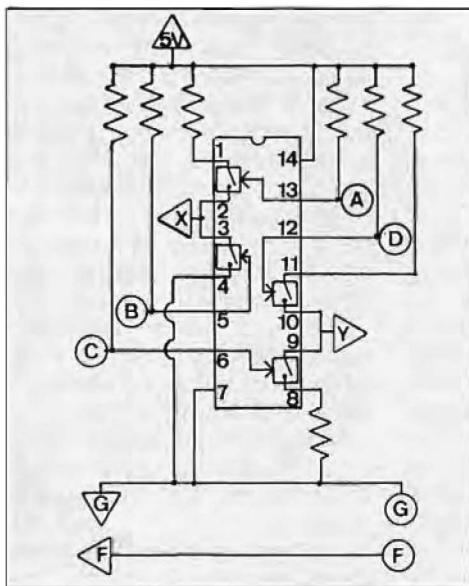


Figure 2. Atari-to-Color Computer converter circuit.

Parts List

4066 quad bilateral switch (Radio Shack 276-2466)

Eight 100k-ohm, $\frac{1}{4}$ watt resistors

DB-9 plug (Radio Shack 276-1537)

Six-pin thinline DIN plug

Misc: pre-etched circuit board (Radio Shack 276-159, 276-153, or 276-170), five-conductor cable, plastic case, 14-pin IC socket, wire, solder, etc.

Note — Six-pin DIN plugs are available from Mouser Electronics, 11433 Woodside Ave., Santee, CA 92071; part no. 17PP048. The plastic shell will have to be cut down to fit into the Color Computer.

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Color Computer 2

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WHAT'S OFF-WHITE, easier to type on, and cooler during use than the Color Computer? Why, the new Color Computer, of course, the "Color Computer 2." Actually, there are two Color Computer 2s, the "Standard" Color Basic version for \$239.95, and the "Extended" Color Basic version for \$319.95.

(What the Extended version has that the Standard doesn't, for the benefit of you novices out there, is the capability of producing graphics, music, and sound effects with much simpler commands. This review, for the most part, addresses only those new features common to both versions of the new machine.)

The most noticeable difference between the old and new machines is that the new one is smaller than its forerunner. It's less than 3½ inches high by 10½ inches deep by 14¾ inches wide. This reduction was accomplished with a major circuit redesign that resulted in a circuit board smaller than 5½ by 12¾ inches. There's also a typewriter-size keyboard like the 64K Color Computer has. It isn't a professional quality, full-travel keyboard, but it's reliable, and a big improvement over the Chiclet™-style board it replaces. Different keyboard supports and a relocation of the keyboard connector have sent at least one keyboard manufacturer back to retool. Cooling vents now travel nearly the breadth of the machine on top and bottom. Even in Maine I've had to take the old model's top off in mid-summer to cool it.

Once inside, you'll wonder what kind of reducing diet Tandy put its engineers on. Aside from the seven major large scale integration parts and eight memory ICs, there are only seven support chips. There's also a notable scarcity of resistors, capacitors, diodes, regulators, and metal RF shield cages. Two tricks were used in this weight reduction campaign: a redesign of the video circuitry that replaced the Astec video modulator with the 1372 Video Mixer, and the use of five-volt-only parts.

A five-volt system means the new machine has a simpler and cooler power supply. The new power system provides

positive and negative voltage, but only the RS-232 circuit needs the negative juice. This means that any ROMport device that requires 12 volts will not function properly, if at all, when connected to the new machine. [The only Radio Shack devices in this bind are the X-Pad (graphics tablet) and the disk controller. A new Color 2 disk controller for the Color Computer 2 is available at the same price as the old one.] Incompatible third party hardware includes EPROM burners, video interfaces, and speech synthesizers. Radio Shack's Multi-Pak Interface provides the 12 volts these peripherals require, though.

The video circuitry has been compacted and is now mounted vertically instead of horizontally; it's also directly in the way of a popular hardware lower-case modification board, however, sending yet another manufacturer back to the design boards. Also, this circuitry uses a pseudo-analog method to provide luminescence and chromanence, which often results in a loss of color in the Semigraphics 6 mode. That mode is not supported by the Basic ROMs, and affects only third party software.

The happiest news is the utter simplicity of upgrading to 64K: pull the eight 16K DIPs (dual in-line packages) out, install the 64K chip, and solder a short jumper (or bridge) across two solder pads to the left of U7 (6822) and behind silk-screen legend W1. There are no cut traces, bent pins, lost stake jumpers, frayed nerves, or expensive repair services to deal with.

With the case and the power back on, the new ROMs state their presence in the sign-on banner. Color Basic 1.2 and Extended Color Basic 1.1 remain the well-known entities anyone would recognize. Color Basic now has its addition and subtraction straight at the extremes, and Extended won't forget where it was working in a program after a PCLEAR. Disk Basic 1.1 is moderately changed from 1.0, including a new command, DOS, to boot the OS-9 Disk Operating System. Machine language software that fails to use the jump table Microsoft provided for the ROM's major routines won't work with this version of RS DOS because every routine has been moved to make room for the new reserved word. Color 2 Disk drive number 0 comes with version 1.1 Disk Basic.

Somehow, the new computer feels sportier. It fits in my briefcase, the small power supply cycles through off and on much faster, and the short travel reset switch (*a la* the MC-10) is clean and crisp.

Now, should I settle for hard disks, or try out magnetic bubble storage?

—J.T., **Color Staff**

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TRS-80 Color Computer Quick Reference Guide

Radio Shack
One Tandy Center
Forth Worth, TX 76102
Catalogue number 26-3194

\$4.95

EVERYTIME I'M PROGRAMMING I find myself grabbing some manual and searching for information about a command, location, or technique. The difficulty lies in keeping all the manuals handy, not to mention finding information that's not always indexed for easy access. Now that I think of it, no one manual contains all the commands, procedures, and information I want.

Well, now there are three new reference guides for the Color Computer programmer, each aimed at a different market. They are: *HELP! Color Computer Reference System*, the *Nanos System Reference Card* (for TRS-80 Color and Extended Basic), and the Radio Shack *TRS-80 Color Computer Quick Reference Guide*.

The *HELP* booklet is designed for the beginner programmer, someone just learning how to use their computer. It's meant to supplement, not replace, the

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Radio Shack manuals. Every Basic and Extended Basic command a novice programmer might want to use is defined and published with two examples, notes about using the command, warnings about common mistakes made by novices when using the command, and page references to commands commonly used in conjunction. You can use the *HELP* booklet as an in-depth index to the Radio Shack manuals. Commands requiring more experience, such as *VARPTR*, are not in *HELP*.

After *HELP*'s table of contents is a 40-page tutorial on programming with the aid of the *HELP* manual. The rest of the booklet lists commands and related information in alphabetical order. To make it easy to find the command you want without having to know the command before you start looking, the table of contents lists every thing in alphabetical order, with entries like "Bytes Left in Memory," "Menu — Letter or Words," "Press AnyKey," and "Yellow Screen."

The tutorial puts you in the place of the computer's CPU — the central processing unit that's always waiting for commands. This gives users a feel for how the computer reacts to commands by comparing the actions of the CPU to an office, like comparing data memory to filing cabinets, and the video screen to a big blackboard.

Sadly, it is wrong in one explanation of the computer's actions. For example, say an operator types in a line: `20 A$= "ALDEN, JERRY,..."`. The booklet says the computer stores the variable information assigned to `A$` to a file cabinet. That's wrong. The variable is not assigned the information until the program is executed. Until then the variable `A$` is unassigned, and the line is simply stored as a program line. Typing Line 20, pressing Enter; then typing `PRINT A$` will show that `A$` is empty until the program is executed. Any other misinformation though, will be objected to only by purists. The booklet is worthwhile for a novice who wants an easy-to-use lever into getting started with Basic programming.

A step up is the Nanos card, which is 30 inches wide and 8½ inches tall, folded to a short 8½ inches by 3½ inches size. This card lists every command in Color Basic and Extended Basic, with one-line explanations of purpose and syntax. It also lists derived mathematical functions like the inverse, hyperbolic, and inverse hyperbolic for sine, cosine, secant, cosecant, and cotangent. A complete listing of the musical notes available on the Color

Computer is there too, with notes displayed in standard musical notation with the Play number, Sound number and octave listed below each note. All the low resolution graphics characters in color, with their ASCII character numbers, are listed.

On the back of the card is a memory map, the Basic reserved words and their tokens, and the entire ASCII character set (0 – 255, listing the keyboard character, the result of *POKE*ing that ASCII value, and just printing it). Next come video, line printer, and daisy wheel printer control codes, video color groups, and PMODE information. Then there's a chart giving the video memory locations as `PRINT#`, `SET`, `POKE`, and the hex value. There's also a brief chart of the extended graphics available with the various PMODES.

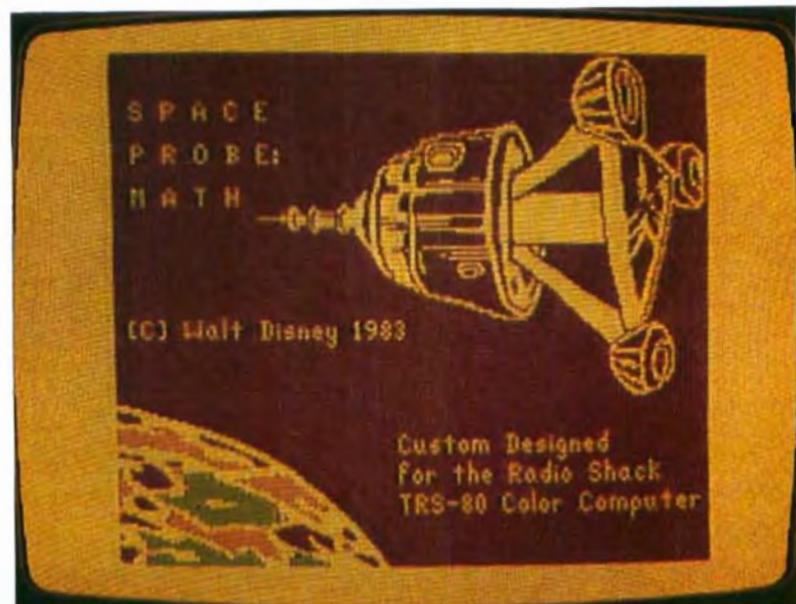
The disadvantage to using the Nanos card is that the Basic commands aren't organized alphabetically. They're organized into groups according to their functions, statements, and system commands. Unfortunately this means input/output commands are divided into two groups, functions and statements. If you're not sure which category the commands you're looking for fall in, you have to check both. This may slow users

down, but helps when they want to find a command that results in a specific result: having all the I/O functions together makes it easier to find the command that does what you want. I'd recommend the Nanos card to any Color Computer programmer who wants a thorough reference guide to jog his memory when programming.

The Radio Shack *Quick Reference Guide* isn't as comprehensive, with respect to Basic, as the Nanos card, but it makes up for it by including more information about each command, and by including information about eight ROM subroutines, about editor/assembler commands, ZBUG commands, 6809 CPU instructions, and color adjustment and video centering tests. A major difference between the Nanos card and the Radio Shack guide is that Radio Shack includes the disk Basic commands.

The R/S *Quick Reference Guide* is for the Basic and assembly language programmer, and for users moving into disk or editor/assembler areas. If you just bought your Color Computer and don't know INPUT from PRINT, try *HELP*. If you don't have disk drives and aren't interested in assembly language programming, try the Nanos card.

—Terry Kepner



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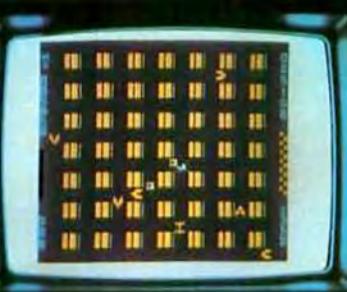
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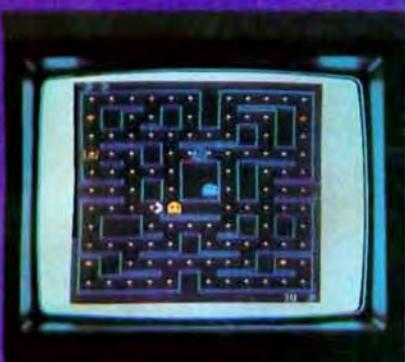


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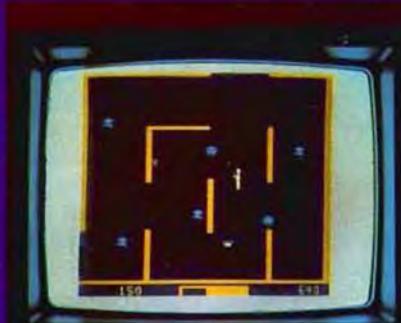
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REVIEW\$

find is that a colony of 1,000 people has vanished. During your search you and your crew become confused, weak, and groggy. You continue, however, and discover a gigantic chamber that looks like a huge beehive with large holes. Inside the holes are people who appear to be in suspended animation. A log book is discovered which indicates the colony was destroyed by a strange and deadly disease. Why? What happened?

Sorry, you'll have to get the program to find out. Does that sound like a math lesson? Believe it or not, the story you just read is an introduction to a lesson on multiplication and division. Excerpts from the story prepare you to decide what math operation to use to solve the problem. For example, they discovered each person needed nine units of a drug in three equal doses. Do you multiply or divide? What is the correct answer? Each of the questions is multiple choice. If you respond incorrectly, TRY AGAIN appears on the screen.

The purpose of the story is to get students motivated to complete those often difficult math problems. The program described above is one of two talk-tutor programs on a cassette from Walt Disney Personal Computer Software distributed by Radio Shack. Entitled "Space Probe: Math," it contains multiplication and division lessons on one side and area and perimeter lessons on the other.

To run this program you will need a 16K Extended Basic Color Computer with a cassette recorder. The story is extremely well narrated and proceeds with exciting background music. The graphics used to portray the story are excellent, too.

The other side of the program holds a story requiring the use of computations to determine area and perimeter. This time the spaceship lands on an earth-like planet that is threatened by volcanic eruptions which will destroy the crops. The inhabitants of the planet live a simple life and have no technical knowledge. Fortunately, the spaceship crew has a special substance that can be used to protect the crops. Your problem is to discover how much of the substance will be needed to cover the crops. Naturally, you need to compute perimeter and area. Once again, answers are selected from a multiple choice menu.

The Disney programs will be packaged differently for home and school use. The school package will contain supplemental materials for classroom use. Now, while this program is recommended for ages seven to fourteen, instructors ought

to be certain it will meet children's or the classroom needs. Considering that most seven-year-olds are in the second grade, it would be logical to assume multiplication and division problems have not yet become a part of their regular math program. The same holds true for area and perimeter. A more appropriate placement is at the fifth or sixth grade level.

—Dr. Paul Kimmelman

Graphic Pak

by Robert Kilgus
Radio Shack
One Tandy Center
Fort Worth, TX 76102
16K
\$39.95 cartridge



GRAPHIC PAK is well done and its documentation is complete and easy to comprehend. With its multi-faceted chart-plotting capabilities, Graphic Pak has many practical, business, scientific, and engineering applications.

With a cassette recorder you can save charts permanently, and with its easy-to-follow menus and prompts, Graphic Pak lets you draw sophisticated charts (as well as chart "keys") quickly. The program gives you the choice of plotting four different types of charts: pie, bar, key, and line, all menu-driven, with optional lettering sizes and positioning. They're printable, too.

The first type draws a pie-shaped chart that can be divided into the number of segments your display requires. Each segment is labeled and a key is drawn to correspond to the labels. The program also shades the pie-slice, which can be offset from the rest of the drawing.

Bar charts may be drawn on either a vertical or horizontal plane. Bar charts can contain one or more items of data for a given period. Key charts are used as a reference, or key, to chart shades versus names. These can be placed at will along with a choice of key chart size and shape. There's the choice of using text, line,

points, or bars for your descriptors, too. Line charts are lines from one point to another displaying a graphic picture of highs and lows. The connecting lines are drawn in the horizontal plane. Numbers indicating a value are located vertically along the left side of the chart and labels appear horizontally along the bottom of the chart.

—Kenn Perry

At the time of this review Radio Shack had announced the release of the disk based version of this excellent program. Color Disk Graphics opens up faster file access for \$49.95.

—Ed.

Talk Tutor Series

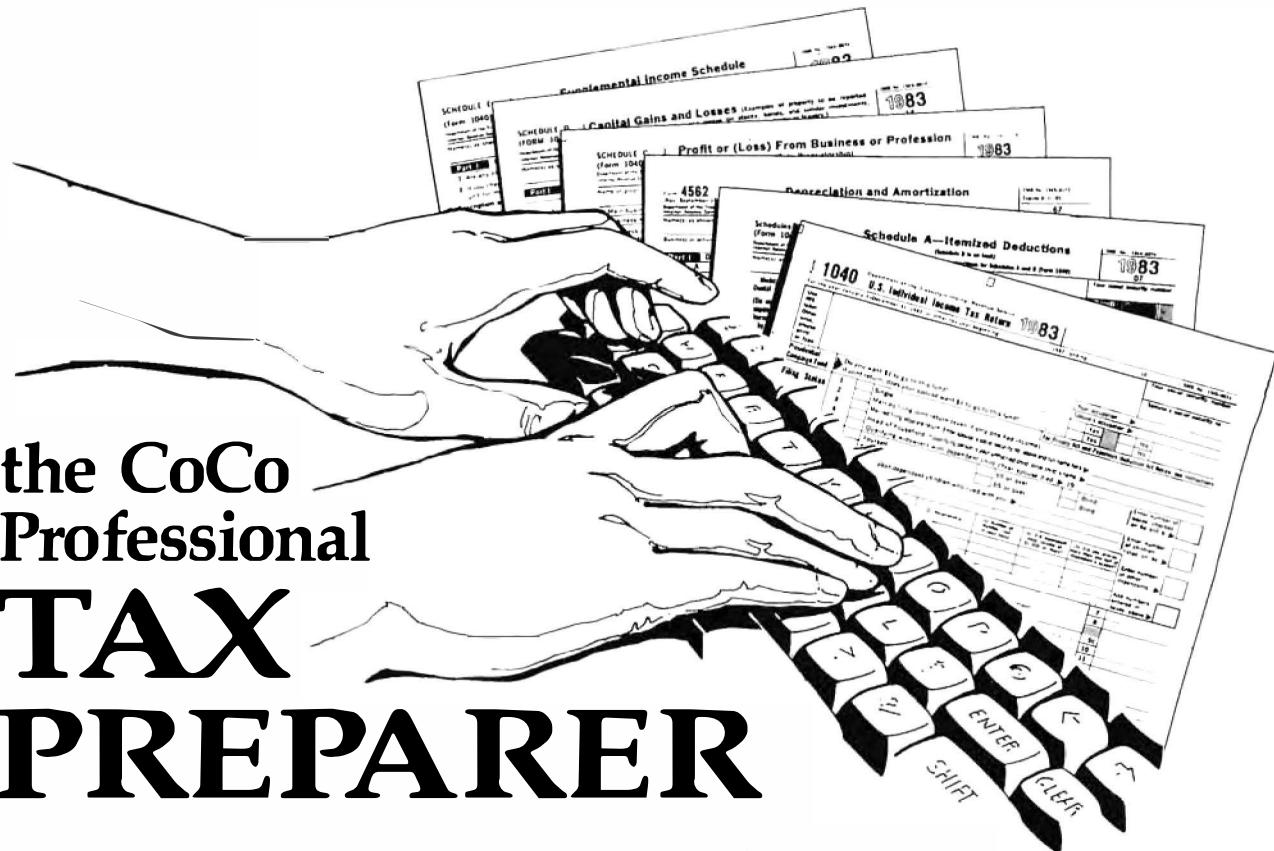
Dorsett Educational Systems, Inc.
Box 1226
Norman, OK 73070
(405)288-2301
16K
\$9.90 for two lessons

DORSETT EDUCATIONAL systems has been a leader in the development of interactive audio visual learning technology for more than two decades. They have now developed a large selection of educational software for use with the Color Computer and some 200 programs should be available within the next few months.

The interactive learning principle requires users to respond to questions by selecting the correct multiple choice answer as the lesson progresses. A correct response allows the program to advance, an incorrect response causes an audible "error" tone. Offering immediate feedback for each response input is an excellent method of instruction.

A major goal of Dorsett is to produce educational software that's both cost effective and instructional. The result has been the Talk/Tutor series, which blends audio and visual displays, creating a unique format for computer-assisted instructional software: the recorded human voice adds a dimension that has been lacking in Color Computer software, the reinforcement of the auditory learner. The Talk/Tutor Learning Systems are state-of-the-art in the auditory reinforcement, and they're inexpensive at only \$4.50 a lesson.

Each Dorsett course contains 16 programs on eight cassette tapes (one program per side). Some of the programs



the CoCo Professional TAX PREPARER

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File your taxes in confidence. The CoCo Professional Tax Preparer is accurate, thorough, and easy to use. Just answer the questions.

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Interview your clients in a time-saving manner and get rid of your check-off sheets.

Produce complete tax returns on government-approved forms. The CoCo Tax Preparer lets you run continuous multicopy forms in the order you need, when you need them.

PROGRAM FEATURES

Designed by a 15-year tax consultant, the program has built-in tax tables and tax rate schedules and supports the following forms:

1040
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 Forms 2106, 2119, 3903, 4797
 Office-at-Home
 Installment Gain
 Dependency Support
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\$99

For a limited time only.
 A \$400 value

MORE FEATURES

- Over 170 full-screen menus displayed on command. Fully menu-driven screens — each appears only when required.
- Full reverse-screen scrolling and forward-screen block scroll.
- Calculator mode supports +, -, *, /, = on numeric data.
- Edit capability: any line at any time. Supports change, delete, back, search, and insert commands. Eliminates the need for check-off sheets
- Runs on 32K extended Basic (one disk drive with change of diskette during program execution) or two disk drives. (A special-order version runs on 64K RAM units with one or two disk drives.) Comes with diskettes and operating manual that describes each screen presentation. Additional forms are available by special order.
- Full disk drive storage for all data and computations.
- Printed output on pin-fed or tractor-fed printers, for government-approved forms.
- Its combination of machine language and Basic is fast and it minimizes memory use.

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REVIEW\$

available address the following subjects: reading comprehension, reading development, spelling, phonics, English as a second language, numbers, fractions, measurements, percents/decimals, basic algebra, physics, United States history, and effective writing. One program titled "Mathematics, Levels 1-6" contains the following lessons: learning number digits; learning number meanings; fundamental drills in addition; fundamental drills in subtraction; drills in multiplication; fundamental drills in division; Greek and Roman numeration; Babylonian and Hindu-Arabic numeration; base 10 raised to powers; grouping and regrouping; lines and angles (naming, adding); triangles, squares, rectangles, circles; fractions (equal and unequal parts); fractions (equal parts of a whole); writing and comparing fractions; and naming and defining parts of fractions.

The "learning number digits" lesson, when executed, offers first a brief explanation of the nine different numerals, then displays them. Then the numeral "1" is displayed and the user is asked to find and depress the "1" key. The program continues with the rest of the numerals, then all of them are reviewed in various ways. At the conclusion of the program a scoreboard listing the total number of questions, the number of correct responses on the first try, and the number of incorrect responses on the first try is displayed.

Dorsett systems gets high marks for program design. The use of professional researchers, writers, programmers and narrators enhances the make-up of their programs. Upper and lowercase lettering is easy to read, and, in most instances, the use of graphics is adequate. Narration is excellent. Articulation of words is clear and exact, even at low volumes. Another positive feature is that the audio portion of the tape loading is not distracting. I have reviewed other talk/tutor programs that came with very distracting computer noise whenever the tape is running.

To access Dorsett programs place the tape in the cassette deck and depress the "play" button, type CLOADM and depress the Enter key. After the program loads, EXEC and depress the Enter key. From this point forward listen to the tape and read the information displayed on the screen. One advantage of the Talk/Tutor is that the "play" button is always depressed because the program starts and stops automatically based upon user input.

Programs will not load if the disk drive is connected to the ROM port. This infor-

mation was not, unfortunately, listed in the accompanying Dorsett catalog. One other concern of mine is the lack of documentation to explain the material in each program. It would be beneficial for teachers to preview the programs before they are incorporated into the class curriculum. I have spoken with the personnel at Dorsett and they welcome input concerning their products.

Dorsett Software Programs are designed for classroom and/or home use. As explained above, they could be used by individuals, small groups or for an entire class. The average time to complete a program is approximately 30 minutes, although when working individually the user should be allowed to proceed at his or her own pace.

Programs are available on cassette tape, and will run on a 16K Basic computer. A complete 16 program course is \$59.90. Individual cassette tapes are available for \$9.90 (this includes two programs). The 16 program course is available with study booklets and 32 pre-posttests for \$75.80.

—David Macalil

ing the game, switch between the East and West, and then continue the game. There are two chances to answer correctly before the computer tells you the answer. You only get half credit if you answer correctly on the second try. The questions are either "fill-in" (two chances to get it right) or "multiple choice" (one chance to get it right). Correct answers generate a pleasing sound and color combination, wrong answers generate a negative sound and statement.

As a teacher, I take objection to the negative sound: it's too loud and too long. It's unnecessary for everyone in the room to know when a child makes a mistake. But there is a cure: the last two pages of the instruction booklet explain, in detail, how to customize The Great USA's sound and queries. Barrick also tells you how to save your new version and how to save the high resolution map with your program.

The Great USA comes in 16K and 32K tape and disk versions for Extended Basic. The "Great USA" map is not on the 16K version.

—Michael F. Garozzo

The Great USA

by G.T. Barrick
Sugar Software
2153 Leah Lane
Reynoldsburg, OH 43068
(614)861-0565

**16K, 32K Extended Basic (with map)
\$19.95 cassette, \$24.95 disk**

"HOW WELL DO you know the states of the United States?" is a question often asked by history teachers of their students. Quite often, students show that they do not know the states as well as they should. And, when they go home, children find memorizing states and capitals boring. Well, here comes the Color Computer program, "The Great USA." The well-documented booklet says the program is designed to make learning fun for the whole family and that this is accomplished by "learning while playing." Does it work? Yes.

"The Great USA" is a combination of a high-resolution, two-part map (East and West), and questions dealing with the states' abbreviations, names, capitals, state birds, flowers, and trees. The program lets you choose tests on each item individually or in random combinations. A nice feature is the ability to bring up the well-designed map any time dur-

Spell 'N Fix

Star Kits
P.O. Box 209-C
Mt. Kisco, NY 10549
(914)241-0287

\$69.29 cassette and disk \$178.58 Flex

S TAR-KITS' "Spell 'N Fix" is a good example of a program where Color Computer users get, for less than half the price, the same power the "big boys" are using. If you do a lot of word processing, this program can be a significant help to you. I ordered Spell 'N Fix to check the manuscript of a biology laboratory manual I'm publishing. Although I was sure no words were misspelled, I thought one or two typographical errors might have been missed. Well, I'm not going to tell you how many mistakes were found by Spell 'N Fix. Suffice to say I was mighty glad I had run the files through it.

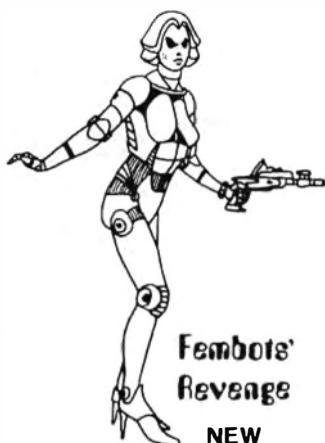
On the disk along with the machine language Spell 'N Fix program are a number of other files. SPELLFIX/BAS is a Basic loader which conveniently gets everything going. SAMPLE/TXT provides you with a sample file to run. BUILD/BAS and LIST/BAS are simple programs to create and list text files. READTHIS/TXT is a text file that contains up-to-date information

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32K Tape \$24.95 32K Disk \$29.95



Coming Soon

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A dark, awful secret is hidden in the cavernous labyrinth. Beyond the chasms, the poisonous gasses, Tunnels of No Return and the relentless minions, the Sentinel hungrily awaits! Sorcerous magick and saintly swordplay are your best friends and worst enemies. You are no ordinary warrior in this ultra hi-res, 3-D medieval adventure! Can you survive to discover the secret - or is there a seat in the netherworld for you too?

32K Tape \$24.95 32K Disk \$29.95



Fyr-Draca

NEW ARCADE GAME

Fyr-Draca (Fire Dragons), from egg to the daemonic behemoth, greet you in five waves with nine colors on the screen at one time! This machine code game is going to sweep the Color Computer market. It is by far, the best game to come out for along, long time. The real arcade look is here at last!

Fire Dragons uses the nine color mode to create a screen of dazzling color with a black background and a black border. Dragons swoop from their stellar watch, singly, in groups and in squadron formation. First you face the single wyrms, then the squadron, next the twin giants, followed by the Battle Drake and its minions. Even with four star vessels and shields you will be hard put to survive their spitting fire and diving attacks!

32K Tape \$24.95 32K Disk \$29.95



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16K Tape \$24.95 32K Disk \$29.95



KOMET-KAZE

Another arcade hit! The Asteroid Belt is crashing down on Earth. You are the first-line defense. You must destroy the blazing asteroids and the noming orbs with your disruptor. Machine-code speed, multi-colors on a black background - the crash and explosions of the asteroids rain on your senses!

16K Tape \$19.95 32K Disk \$24.95



Xygoid NEW

Your ship is being enshrouded by the Xygoid Web. Certain death is minutes away! You must blast through the enveloping Web and destroy the Xygoid vessel before you are crushed. This is a multi-colored machine-code game in the highest resolution mode on a black background. Xygoid, from the galactic beginning! It will ensnare your mind!

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Ever increasing Waves of Landers, Fighters, Air mines and Smartbombs help the enemy capture the Earthlings on the planet surface. Your phaser and photon bombs will be a solid defense. In multi-colored surroundings you do battle to maintain control of your homebase!

32K Tape \$19.95 32K Disk \$24.95



Adventure Trilogy

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16K Tape \$24.95 32K Disk \$29.95



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16K Tape \$19.95 16K Disk \$24.95

All Game Names are Trademarks of Softlaw Corp.

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REVIEW\$

about Spell 'N Fix. BINCON/BAS can be used to convert binary files to the ASCII format required by Spell 'N Fix, although now that Telewriter has ASCII capability I don't know of any word processors that would call for this. A useful little one-liner is RESET/BAS which lets you reset your system as if you had turned it off and on. If you have any 64K programs, you should add POKE&HFFDE,0 as the first statement to reset the ROMs.

Most impressive is DICT/TXT, a dictionary file of 20,000 of the most commonly-used words, which takes up 33 granules in compressed format. I didn't have a good idea of how much information that is until I started adding all the scientific terms in my lab manual. All of them together added one measly granule to the file! You can add a new word to the dictionary very conveniently; you also have the options of ignoring it, marking it for later correction, or changing it. You can even create a brand-new dictionary if you don't like the 20,000 words that have been provided.

The program is copy-protected and has to be reloaded from the master disk for each text file that is to be checked.

The print option sometimes prints too much (right and wrong words) or too little (nothing, if you're adding all new words to the dictionary). The program checks only the first 31 characters of a word, so if you use a lot of words like disestablishmentarianism... hmmm, that's only 24. Well, you see what I mean.

This is a top-drawer piece of software.
—Dr. Lane P. Lester

Disk Zapper

Prickly Pear Software
9234 East 30th St.
Tucson, AZ 85710
(602)886-1505

**32K
\$34.95**

DISK ZAPPER is a utility designed to help disk users overcome some of the shortcomings of the Color Computer disk system. It has several features that should help most disk users keep their disks healthy. It requires at least 32K to run, with 64K required to use some of the bells and whistles.

One of the nicest things Disk Zapper does is let you format disks to as many as 40 tracks. Basic cannot use any track be-

yond number 34, but you can get the other five from machine language. Tandy's own drives are officially rated at 35 tracks, but all (except for the very early production drives) will handle 36 tracks. This extra track can be used by Disk Zapper to keep an extra copy of the disk directory in case the disk directory on track 17 should become unreadable.

Another nice thing Disk Zapper does is let you back up a disk without crashing if it encounters an I/O error. Coupled with the directory stash function, this allows you to back up most disks that have crashed. All you need to do is to copy your bad disk onto a new one, and get the old directory from the bad disk off track 35.

There is also a very useful disk editor included. The editor allows you to look directly at your disk in either ASCII or hexadecimal, and to change information on the disk. This is a good way of keeping your programs private; you can easily fix a few bytes in the directory so no one else can run the program unless they know how.

Disk Zapper will be a welcome addition to most disk users' libraries. The manual is short but well written, and there are good "tips and tricks" on using this program effectively.

—Chris Erving

Editor's note: Prickly Pear now says this program has been changed to modify DOS on a 64K machine so that while in Basic 40 tracks can be used.

Cross Words

by The Image Producers, Inc.
Radio Shack
One Tandy Center
Fort Worth, TX 76102

\$24.95 RomPak

THIS IS A Scrabble-like game in which each player receives seven randomly selected letters with which to create words to place on the playing field. The game is for one to four players. It is both challenging and at times frustrating, as anyone who has played Scrabble with a time limit can imagine.

You play the game by making words out of the letters assigned and those already on the playing field. Words are made in a crossword pattern, using one or more of the letters on the playing field.

The game has the option of limiting your playing time, forcing you to create words in four different time periods: 30 seconds, 60 seconds, 90 seconds, or no time limit. You also have the option of using the keyboard or the joysticks.

The joystick mode was the only feature I found that needed to be improved. When pressing the button on the joystick to add or delete a letter to the word you are making, very often two or more letters in the list would be added or deleted. This was especially frustrating when you finish a word and send it to the playing field while competing with other players. Upon sending the word to the playing field, verification mode is entered. If your joystick button is down, it is assumed this is not a good word, the word is refused, and your turn is terminated.

Outside of the joystick problem, this is a very good game and will keep you busy for some time.

—Jim Mills

Magic Spells

Follett Library Book Co.,
Crystal Lake, IL 60014

**\$40 cassette
\$55 disk
32K required**

QUICK! WHAT DOES "laMlpe'srp vaoemslur pdxmueiaiMgc spilles mkae nmdis" spell? The answer is, "Merapple's mixed-up Magic Spells make marvelous minds." Easy? Not by a long shot. Magic Spells is the newest release of the Learning Company programs converted by Follett Library Books for Color Computer users.

Magic Spells is an educational game that teaches spelling by requiring the student to unscramble words, or to recall them, after seeing them briefly flashed on the screen. This program can be used in a variety of grade levels because of the many options provided.

To begin, you enter the Kingdom of Magic Spells. Your tour through the kingdom will be guided by the Wizard of Spells as you search for treasure chests that contain gold and jewels. You get your treasure when you correctly spell the words. If you spell a word incorrectly, the Spelling Demon will be there to take some of the treasure. You get more than one chance to spell the word correctly, however, so the treasure can be divided, a nice feature for young children or those who have difficulty with spelling. With

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Chromasette
P.O. Box 1087 Santa Barbara, CA 93102
(805) 963-1066

divided treasure, frustration can be kept to a minimum.

Magic Spells comes with three main options: Scramble Spells, Flash Spells, and Spells Writer. It is here that there is a major difference between the product's cassette and disk versions. First, the cassette programs are packed separately, i.e., one cassette for Scramble Spells and one for Flash Spells. Second, the Spells Writer option is part of Scramble Spells and Flash Spells on the cassette version while it is not only part of the two programs on disk, but also a main menu option on disk. That main menu option allows users to create their own, additional, word lists. Users still have the option, however, of creating lists in each of the cassette programs, too.

In Scramble Spells, the wizard shows players words that have been scrambled. Players then type the scrambled word correctly. Hints can be given if necessary, but use of hints negates the chance to gain points. If you unscramble the word correctly on your first attempt, you get full credit, but for each further attempt you must share points with the demon.

Flash Spells requires players to remember the word that is flashed on the screen. Players are then required to spell the word correctly by typing the correct letter on a designated line. In Flash Spells the amount of time the word will appear on the screen may be set anywhere from one to nine seconds. You can also reduce the standard flash time by pressing the spacebar.

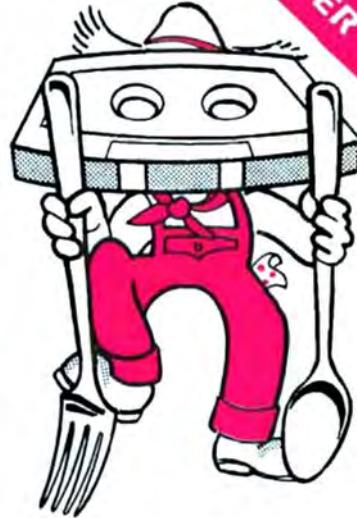
Both Scramble and Flash Spells have menu options. One is to use the wizard's word lists. They are divided by category, each with some common words. Some of the categories and a few sample words are "at" words like "at," "fat," and "bat"; color words like "red," "yellow," and "purple"; fruit words such as "apple," and "raspberry;" musical words like "symphony," "violin," and "xylophone"; and demon words like "beautiful," "criticize," and "business".

Spells Writer, as a main menu option on disk only, allows you to change the wizard's lists or add up to four additional lists. The opportunity to make your own lists really sets the grade level you believe most appropriate. Parents should especially like the opportunity to put their children's weekly spelling words in this program and work with them to ensure spelling mastery.

Magic Spells is fun to play and should help anyone become a better speller—and have fun doing it.

—Paul Kimmelman

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Utilities #1 - Programming is simpler when you use Lister, Listmod, Newtrace (a better TRON), Lazkey (define keys as phrases), Append (easily combine two BASIC programs), BASIC Map, Varmap, Deleter, and CK Monitor (look at and modify memory).

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great-looking drawings, charts and diagrams! The Standard BASIC language includes data and string handling capabilities, dimensioned arrays, math functions and 9-digit accuracy.

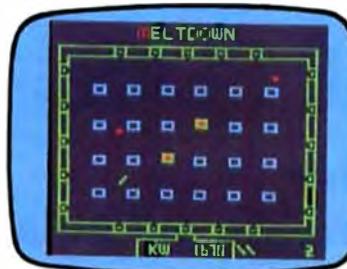
Easy to Expand. The Color Computer expands when you're ready with a cassette recorder, joysticks, color mouse controller, printer and telephone modem. You can add more memory and up to four disk drives, too!

Extend Your Abilities. Want to create high-resolution graphics or write sophisticated programs? Then the 16K Extended Color Computer 2 is the answer. You'll find it's easy to create elaborate geometrical shapes and drawings—even simple animation! You can even teach yourself how to create your own arcade-type games. You get all the great features of the 16K Standard version, plus Extended Color BASIC's powerful programming features, such as PEEK, POKE and USR commands, multi-character variable names, string arrays up to 255 characters, full-featured editing and tracing. You also get both the Standard and Extended BASIC tutorial manuals, so you can become an expert programmer in no time at all.

CGP-115 Color Graphics Printer. A perfect match for the Color Computer. It easily prints charts, graphs, computer-generated "doodles," programmed pictures and more in red, blue, green and black on 4 1/2"-wide paper. Commands built into this "smart" printer simplify drawing and plotting. Text mode prints 40 or 80 characters per line at 12 characters per second. Software controls additional character sizes and rotation. The CGP-115 uses easily replaceable ink cartridges. Measures only 2¹⁵/16" x 8 1/4" x 8 1/2" and weighs just 1 3/4 pounds!

TP-10 Thermal Printer. The affordable way to get program listings, text and data printouts. Prints non-color graphics, too. And TP-10's thermal operation is so quiet you'll hardly know it's there! Text mode prints 32 characters per line at 30 characters per second. A special repeat function makes graphics programming easier than ever! Uses 4 1/8"-wide paper. Measures just 3 x 8 x 5".

Available Nationwide. Find out how your family can benefit from owning the exciting Color Computer 2. Visit your nearby Radio Shack Computer Center, participating store or dealer today and ask for a "hands-on" demonstration.

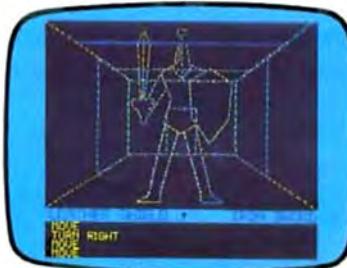


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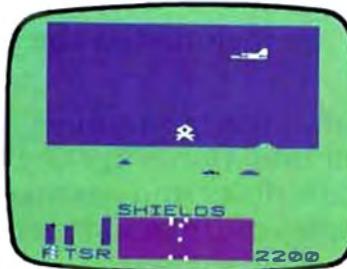


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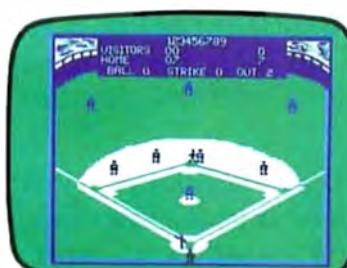


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THE BENEFITS—Consortium schools will automatically receive updates and new program releases at no increase in membership fee. There will be no shortage of quality software for the most popular computers.

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BERTAMAX INC.
Max Jerman, Ph.D.,
President



ACT NOW—Form your own consortium and contact us. Contact us directly for the names of interested schools in your area.

At Last—A Software Solution

Morse Code Modem

Mitronix
5953 N. Teutonia Avenue
Milwaukee, WI 53209

The KA9FSQ CW modem changes radio tones into digital pulses, allowing ham radio operators to transmit or receive morse code on their Color Computers. The modem uses an optoisolator to keep keying voltages away from your computer and give a clean digital pulse to your transmitter. Plug the cartridge into the ROMPak slot and connect two cables, one from your transmitter and one from your receiver. Turn on and CLOAD the program from tape. Run the program, sit back, and enjoy Color Computer Morse. The price is \$50 including a 90 day warranty.



Dyterm

Dynamic Electronics
Box 896
Hartselle, AL 35640
(205)773-2758

The Dyterm cassette is an inexpensive way to turn a Color Computer into a smart terminal. Its main features include: an ability to handle rates of 300, 600, 1200, and 2400 baud; word lengths of seven or eight bits; even, odd, or no parity; and one- or two-stop bits. Dyterm's user-defined data buffer memory can be changed at any time. It transmits characters from the keyboard or from a data buffer memory, it allows characters to be stored in the buffer memory before sending them, and stores received characters in the data buffer. Users can also automatically switch from receive character mode to transmit mode by touching any keyboard key. Its Basic program with machine language subroutines can be user modified, too. The cost is \$14.95 for the cassette. The Dyterm cartridge costs \$24.95.

Scan-Out

National Research Group
11580 Oakhurst Road
Largo, FL 33544
(813)595-2853

Scan-Out is an RS-232C selector switch and a status indicator that connects your Color Computer to peripherals and lets you switch between them without disconnecting everything. At the same time it monitors data to help you troubleshoot and test your equipment. It comes with three line cords and two LED displays and costs \$24.95.

BWdev

PBK & Associates
5603 Linwood Court
Seabrook, MD 20706
(301)577-2930

PBK's BWdev program asks questions about the variables involved in processing black and white film, then calculates them and starts timing processes for each step. It uses tones

to remind you when to agitate your film. The program is designed to work with Tri-X, Plus-X, and Panatomic-X films, and Microdot-X, D-76, and HC110 developers. BWdev comes on tape and costs \$19.95.

Alphacom 42

Alphacom Inc.
2323 S. Bascom Avenue
Campbell, CA 95008
(408)559-8000

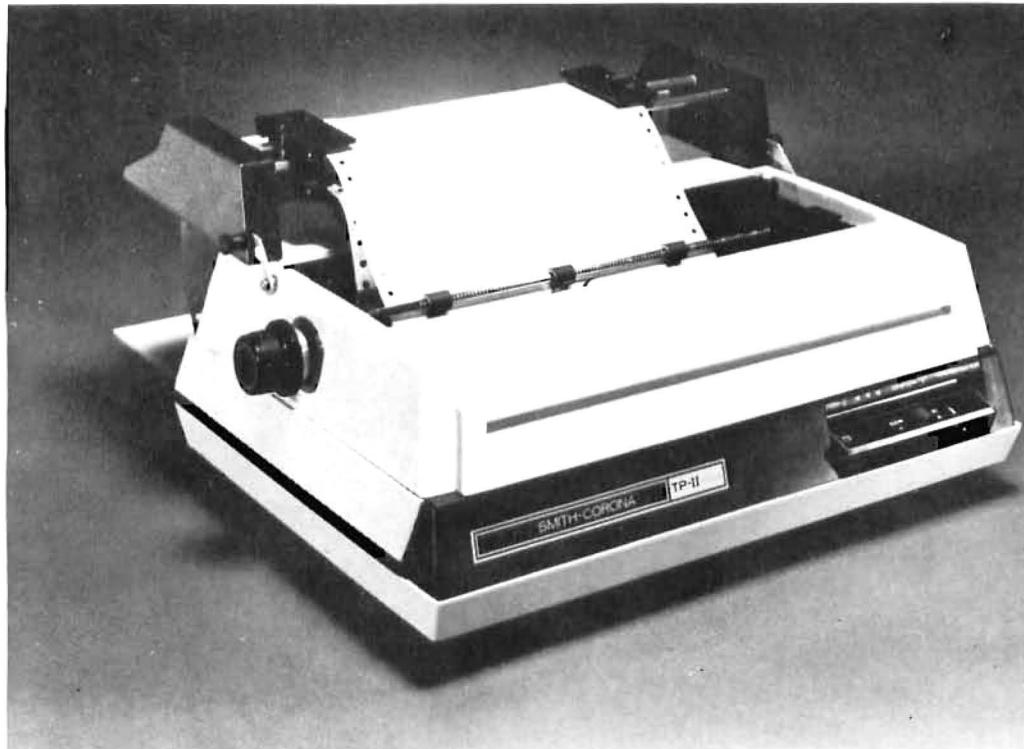
Alphacom has cut the suggested retail price of its Alphacom 42 printer to \$99.95. The company says it's the first to break the \$100 price barrier in the universal printer market. The 40-column thermal unit combines a single-chip microprocessor with Olivetti mechanics. It operates at two lines per second and has bit-mapped graphics, wraparound, upper and lower cases, and ASCII control recognition. The price includes an interface cable, but the printer may be bought without the cable for \$79.95.

Do

Lloyd I/O
19535 NE Glisan
Portland, OR 97230
(503)666-1097

A 4K-long job control language from Lloyd I/O called "Do" is intended for batch processing. It requires 8.5K of memory and may be assigned more if the application procedure is larger than the buffer. Do has 26 number variables, nine string variables, 17 Basic-like directives, and error trapping. It allows passing parameters for substitution and labels for controlling execution flow. Labels can be any length and in any series of characters with no embedded spaces. Comments are allowed but not loaded into memory when Do reads a procedure from disk. Fatal (syntax) errors result in error messages and a pointer to the character where the error was found. Using Do commands as OS/9 commands, Do procedures can be nested or chained. With a 30-page manual, Do is available for \$99. It comes on either 5 1/4- or 8-inch disks.

■ ■ ■ NEW:PRODUCT\$



TP-II Plus

Smith-Corona
65 Locust Avenue
New Canaan, CT 06840
(203)972-1471

Smith-Corona's latest letter-quality printer is the TP-II, a text machine that boasts multiple pitch, bi-directional printing, options of 10, 12, or 15 characters per inch, and two interface ports — the RS-232 serial and the Centronics parallel. The TP-II Plus also features a parity switch, a self test switch, automatic underscoring and carriage return, programmable margins and tabs, a 570-character buffer, and easy-to-change ribbon cassettes and print wheels. There's an optional tractor feed attachment for continuous form fanfold paper, too. Smith-Corona's suggested retail price is \$645. for the printer, \$149 for the tractor feed.

Learning Arts Catalog

Learning Arts
Box 179
Wichita, KS 67201
(316)682-6594

The fall/winter 1983-84 Learning Arts catalog is 64 pages long and includes 3400 educational programs, over 50 of them for the Color Computer. Subject areas include English, spelling, mathematics, business, chemistry, history/geography, music, and computer literacy. The catalog is free to education professionals. Its cost to anyone else is \$1.

Random Basic for OS/9

Computerware
Box 668
Encinitas, CA 92024
(619)436-3512

Computerware's Random Basic is available for the Color Computer's OS/9. The language

comes on disk only for \$75, and some of its features are: nine or 11 digits of precision using BCD arithmetic; ISAM, random, and sequential file structures; transportable existing programs; and "conversational" programming with flexible input commands. Output formatting is accomplished with PRINT USING commands, automatic pagination, left and right justification, and decimal point alignment. Random Basic for OS/9 has been tested. Computerware says, for five years.

Kids' Keyboard

B5 Software
1024 Bainbridge Place
Columbus, OH 43228
(614)276-2752

B5's Keyboard program helps children learn where the keys on the keyboard are and helps poor typists learn proper keyboard fingering. Its graphic keyboard lets users find keys quickly. Lessons are built around al-

phabet and individual letter drill presentations. There's a \$10.95, 16K version and a \$24.95, 32K version. The 32K version has longer drills and a timer for lessons. The Keyboard costs also comes on disk for \$26.95. An optional phonic drill data tape that reinforces phonic structures as letters and words are typed costs \$8.95.

Commterm

Star-Kits
Box 209
Mount Kisco, NY 10549
(914)241-0287

For the cost of a blank cassette and a stamped, self-addressed envelope, you can get Star-Kits' Commterm, a new communications terminal program for the Color and MC-10 Micro Color Computers. You also get permission to copy and pass it around, provided you evaluate the program and send Star-Kits what you consider a fair contribution to "encourage further development and marketing" of similar programs. Comm-

term provides access to remote bulletin boards and timesharing devices. It can also act as a terminal on-line to other computers. It usually costs \$19.95.

Key 264K

Key Color Software
Box 360
Harvard, MA 01451
(617)263-1737

Got a 32K machine with good memory chips? Now you can access the 64K inherent in your system as two banks of 32K, each of which acts as a separate computer, with no hardware modification. Each 32K memory bank is switched in and out of Basic memory. Key 264K will work on both cassette and disk systems, and no modifications are necessary for users currently working with cassettes but planning to buy disks. The program comes on a cassette. The Basic interpreter has been expanded to include commands to allow passing variables.

PEEKing, POKEing, duplicating, copying blocks of memory, and copying Basic program lines.

Text and/or graphics screens from either data bank can be viewed and two programs can run at the same time. A 75-page user's guide is included. This product will not work, warns Key Color Software, on piggy-back 32K systems or systems with "half good" 64K memory chips. The cost is \$39.95.

Color Baseball

Radio Shack
One Tandy Center
Fort Worth, TX 76102

Now you can play baseball with a friend or with a computer no matter what the weather. Color Baseball consists of two teams (red and blue) controlled by joysticks. Names and batting averages can be assigned by either users or the computer. Players can be instructed to steal and slide. Whether your team's in the field, or your man is at bat, you control the action. Extra innings are available in case of tie scores at the bottom of the ninth. Color Baseball costs \$24.95 and requires at least a 16K machine.

Tape to Disk

Stuart Hawkinson
6695 S.W. 203rd Court
Aloha, OR 97007
(503)642-9146

Disk Loader loads most 16K assembly language programs from tape to disk. This new program takes tape based assembly language programs, stores them on disk, and lets them run automatically. It's specifically designed to load programs that interfere with normal disk operations. It saves multiple copies, allows renaming the program, and automatically gives program load and execute addresses. Disk Loader is supplied on tape with easy-to-operate instructions, and works with

any 32K or 64K Color Computer disk system. It costs \$13.95.

Test-Aid

Infotools
111 Country Club Lane
Oxford, OH 45056
(513)523-8473

Test-Aid is a test-item management program that allows the creation of four-item, multiple-choice exams. Test-Aid will create a large bank of test items, edit those items, display and select items from the bank for inclusion on an exam, and print a formatted copy of the exam. Test items are generated with the help of formatted entry screens. Individual items can be up to 700+ characters long. Multiple banks can be stored and loaded from tape. Selection and ordering of items for an exam is accomplished with index numbers. The standard version of Test-Aid is written for a 32K or 64K computer and is priced at \$18.

Thrilling Games for the Tandy Color Computer

Addison-Wesley Publishing Co.
Reading, MA 01867
(617)944-3700

A group of Dutch games fanatics were recently rounded up by Addison-Wesley to create a games book for "everybody from six to 96," says the introduction to *Thrilling Games for the Tandy Color Computer*. Included are over 30 action, board, and arcade games, brainteasers, puzzles, and games "in a class of their own," including a screen version of Rubik's Cube. Program listings follow each game description. Eight of the games require Extended Basic. The 145-page paperback costs \$5.95.

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Bhe king is dead. Long live the king. I have not quite begun formally mourning my beloved Basic, the language that brought computing into the elementary schools. The fifth and sixth graders parading through my electronic classroom are not yet wearing black armbands in memory of long lost GOTOS. They still proudly sport their "I Speak Basic" buttons, badges of honor that still rank above smelly stickers. They take great pride in studying the same language their older brothers and sisters are learning in the eleventh and twelfth grades.

However, Basic is an endangered species in America's schools.

Last spring the Education Testing Service (ETS, famous for managing the Scholastic Aptitude Test) announced they would offer an Advanced Placement examination in computer science, beginning in the spring of 1984. This decision was heartily embraced by educators at all levels. However, there is a hitch. The test will be language specific, and that language will not be Basic. The exam will be totally based on Pascal.

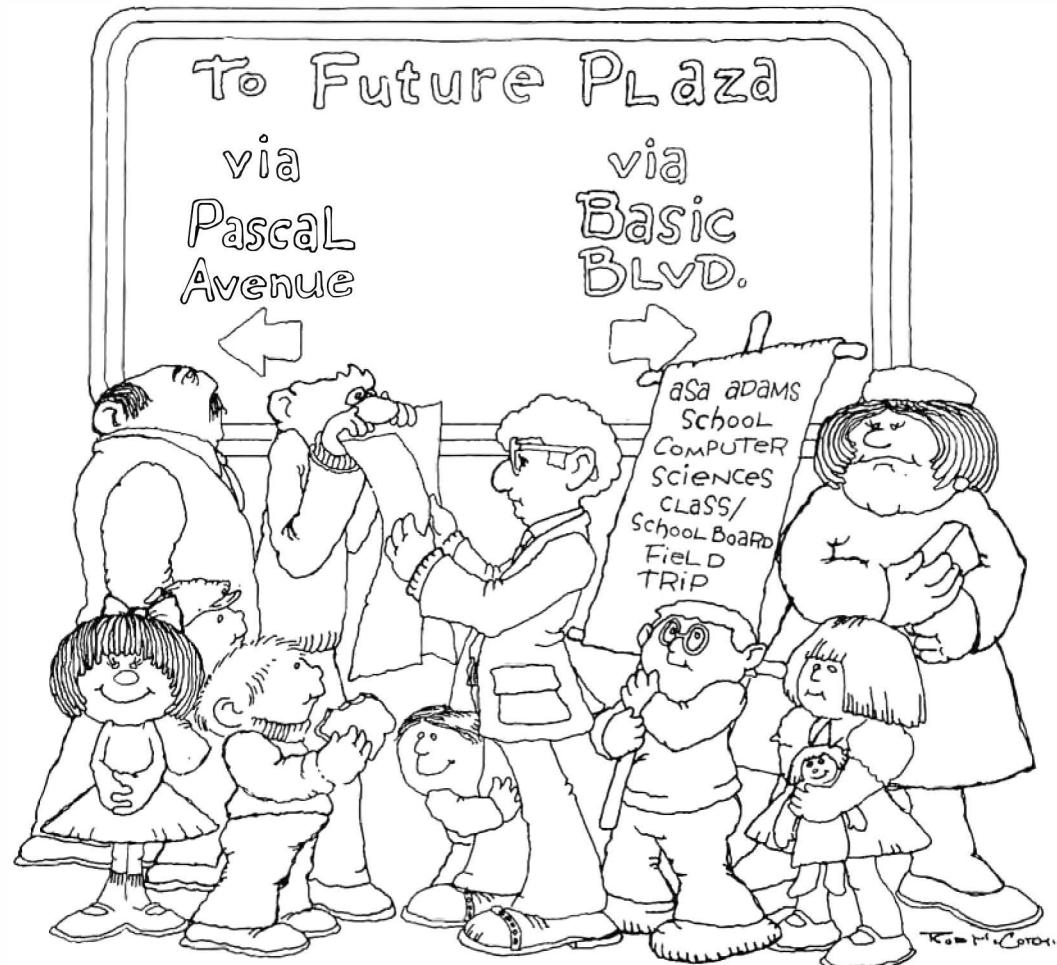
This decision disregards the realities of our present school situation. Virtually every school in the United States using microcomputers uses them with built-in Basic. Most user schools have a staff competent to teach Basic. It is difficult to find schools that even have Pascal available. Consequently, few teachers are versed in the language.

Many computing high school teachers scrambled to find

courses in Pascal over the summer. The availability of training in languages other than Basic is scarce. I've been told this won't be a problem next year, but I still wonder about the many talented high school seniors whose programming roots are in Basic. There are many high school seniors throughout the country doing amazing things with computers, most of whom have been taught to compute in Basic. The class of '84 just plain hit it wrong.

The outlook for the class of '85 is not so hot, either. Even if a school system has personnel trained to embark on the Pascal frontier, there is still the problem of expense. The Apple version of Pascal, for instance, requires a minimum two-drive system for programs of any length. Three are apparently more realistic, if one wants to avoid constantly shuffling disks. By all accounts, Pascal is much harder to debug than Basic. (Pascal is heavily seasoned with semicolons, and misplaced semicolons are difficult to spot.) Using a printed copy of the program for debugging is a great improvement over debugging from the screen. Additional printers are recommended by veteran Pascal instructors. Schools will now have to commit a significant portion of their computer budget to upgrading their equipment. Therefore, purchasing more computers may have to be postponed. This in turn will mean a smaller percentage of the total school population will ultimately be exposed to programming.

Professor Ludwig Braun, Director of the Academic Computing Laboratory at the New York Institute of Technology, is strongly opposed to the decision to base the advanced



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COLORMATE unleashes the power of the Color Computer! It expands any standard CoCo with 16K and floppy disk to allow operation of SDOS, a fast, time proven operating system, and powerful program development tools like the BASIC Compiler. SDOS handles floppies and optional Winchester disk transparently. BASIC provides very fast code, long names, true subroutines and powerful disk file I/O.

Screen above is unretouched photograph of ColorMate display. Disk Extended BASIC is not required.

COLORMATE is \$495.00. Includes 400+ pages of documentation. Radio Shack floppy controller and floppy disk drive not included. Word processing, accounting, and Winchester disk drives are available. Write or call for details. Dealer inquiries invited.



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END OFFICE

placement (AP) test on Pascal. Writing in the September, 1983 issue of *Electronic Learning Magazine*, Braun argues that the exam should not be language specific. He says:

"In my opinion, the fundamental purpose of an AP examination is to establish sufficient mastery of a subject that a student may be given college credit for a course on that subject. In an AP exam on computing, the student should be tested on her/his mastery of the process of converting a problem into a computer program that will solve the problem."

Braun lists several steps in the problem solving process, only two of which depend upon a specific language. He also criticizes the test's heavy focus on mathematics. In his mind the ETS is erroneously suggesting that effective computing and mathematics go hand in hand. Many young people who are outstanding programmers are not, actually, very good mathematicians.

Why was Pascal chosen?

Computer scientists claim Pascal forces programmers to think most logically when attacking problems. Basic imposes little discipline upon the programmer. If a sub-problem is overlooked, a simple GOTO will most often reintroduce the omission. Pascal requires that a program be replanned as a series of stages. These stages are refined and eventually strung together in a logical sequence. Pascal is the torch carried by leaders of the structured programming movement. The call for top-down programming has been sounding for years, initiated by maintenance problems with Cobol and Fortran.

Beginners often complain about Pascal's unfortunate syntax and the crashes caused by data incorrectly entered from the keyboard. The language is *not* user friendly. These obstacles can lead to excellent lessons on error trapping. Students of Pascal find it usually takes longer to debug a Pascal program than a Basic program, due to a delay as the Pascal compiler finds syntax errors one by one. This problem can encourage students to plan more carefully before they go to the machine. The ancient computer adage, "An hour on paper can be worth ten on the keyboard" rings true with Pascal.

Other features of Pascal make it a natural progression for children who presently learn Logo and Basic in elementary and junior high schools. Pascal has a strong set of graphic commands (it supports both cartesian and turtle geometry). Many children who are visual learners grasp sophisticated computer concepts through the production of original graphics programs in Basic and Logo. Graphics programs are easily understood in Pascal and encourage good top-down programming. Logo is built around this concept of breaking a whole problem into sub-problems. Elementary students in the 80's will be very comfortable with this type of problem solving approach.

Perhaps the most convincing argument for Pascal is that it is standardized. If carefully written, a Pascal program can be transferred to any machine, micro or mainframe. Basic is different on every micro. While the economics of the software business encourage incompatibility, many computer scientists urge the programming community to work toward a standard language.

Many Pascal exercises for the beginner can be reworked assignments that have been previously used when teaching Basic. Students with Basic experience should have a solid un-

derstanding of Pascal's loops, If/Then statements, and arrays. The biggest roadblock for Basic users is understanding the Repeat/Until and While structures in Pascal. The temptation for Basic enthusiasts again is to rely on the ever-faithful GOTO statement. I predict this transition will be eased as more and more young children are exposed to Logo. Those who become adept at using Logo's Repeat command will ease into this aspect of Pascal.

Will Pascal be available for Color Computer owners? Absolutely. Radio Shack has shown a firm commitment to the educational market and is no doubt sensitive to the rumblings about the language and the ETS' decision.

Schools throughout the country will soon be forced to decide whether or not to prepare their students for the AP exam. My guess is that most schools will try to adapt Pascal into their curriculum. New York State is already hinting that future Regents Examinations in physics will involve a knowledge of Pascal. I would not be surprised to find Pascal taught in thousands of junior high schools five years from now.

Some days I feel that I still have plenty of time left to savor glorious moments in Basic. After all, it was the first language I learned, and will be forever etched fondly in my memory bank. Teachers have not been known for jumping on band-wagons quickly. History tells us that 200 years went by after the book was invented before it was used by teachers. Unfortunately, our pressing unmet societal needs and the pressures of other countries, notably Japan, don't allow us that much time. We need gifted, highly trained problem solvers. Effectively teaching problem solving, or indeed, solving problems efficiently, can only be accomplished if there is ready access to the required knowledge. The ETS has declared Pascal to be that required knowledge.

There's no sense teaching Latin where the natives are all speaking Greek.

— J. Craig Dickinson
Educator, The Asa Adams School

FOR...NEXT (03,84)

LET'S ALL CELEBRATE the coming of spring with an issue full of interesting and exciting things. And let's also celebrate the first year anniversary of **The Color Computer Magazine**.

The Color Computer is a super machine, and our readers are super users, so let's have some super articles. Dennis Kitsz has promised an EPROM programmer, and as a bonus, we have a variation on that procedure by William Clements, Jr. Here's a first — the very first 3-D, rotating graphics display for the Color Computer that we've ever seen will be coming your way in March. We're also planning some special articles on communications that you won't want to miss.

All your favorite regulars and more will also be there, so be sure to catch us in our super March issue!

COLOR COMPUTER SOFTWARE

GAME PRICES
Cassettes \$24.95
Disc. \$27.95

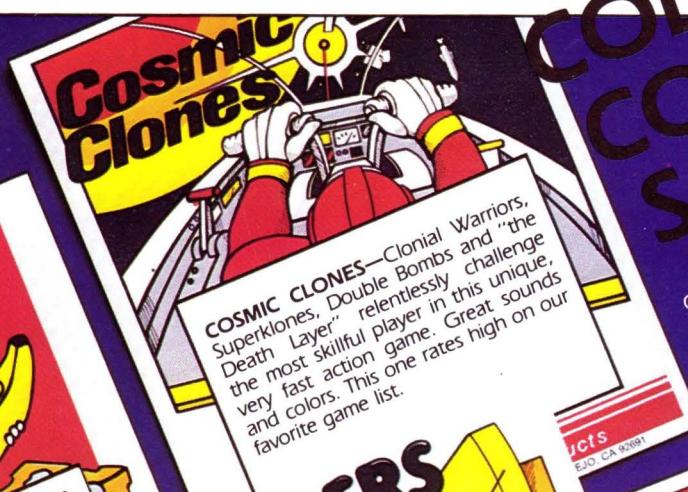


EL BANDITO—El Bandito has to be a crafty little hombre to stay alive as he loots the local countryside. Challenging fun for a single player or two may compete simultaneously for a unique playing experience.



SHENANIGANS—You dedicated adventure fans without discsystems have asked for this one... all the fun and challenge of Calixto and Sanctum plus spectacular graphics. From the heart of the city to lonely wilderness. There's a pot of gold at the end of the rainbow, but you can bet it won't be easy to find.

Mark Data Products
24001 ALICIA PKWY., NO. 207, MISSION VIEJO, CA 92691 • (714) 768-1551

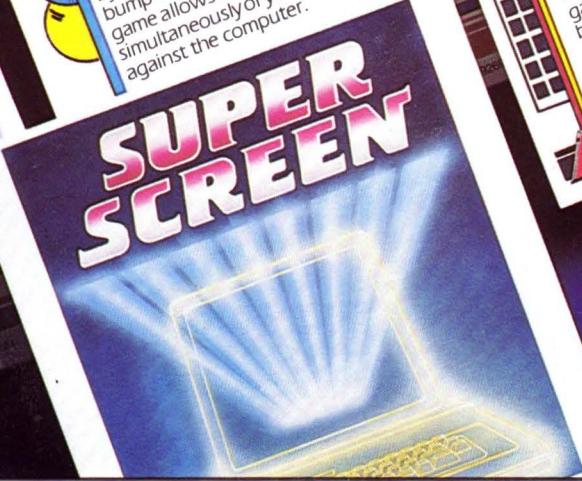


COSMIC CLONES—Clonal Warriors, Superklones, Double Bombs and "the Death Layer" relentlessly challenge the most skilful player in this unique, very fast action game. Great sounds and colors. This one rates high on our favorite game list.

ECTS
EJO, CA 92691



BUMPERS—Tension mounts as you race through a randomly generated maze made even more challenging by walls that are invisible until you bump into them. This outstanding game allows two players to compete simultaneously or you may play alone against the computer.



SUPER SCREEN

MD Mark Data Products
24001 ALICIA PKWY., NO. 207, MISSION VIEJO, CA 92691



GLAXXONS—Pit your playing skill against squadrons of swooping, diving spacecart. This is a fast and furious version of the arcade game with seven selectable skill levels and automatic game acceleration. Guaranteed to blister your joystick finger.

SUPER SCREEN
Cassette \$29.95
Disc. \$32.95

SPACE RAIDERS—A sensational rendition of the arcade classic. No collection is complete without this invaders type game. Great sounds and tense action. We think it's the best. **Cassette—\$24.95 / Disc \$27.95**.

CAVE HUNTER—Maneuver your way to the bottom of a spooky old cave to retrieve the treasures. It's fun but not easy! Passages lead in all directions and angry cave creatures pursue you relentlessly. A fast placed arcade game. **Cassette—\$24.95 / Disc \$27.95**.

ASTRO BLAST—Wave after wave of alien attackers—each one different and unique. A great space "shoot-em-up" with hi-res graphics, lots of color and dramatic sound effects. A continuing best seller. **Cassette—\$24.95 / Disc \$27.95**.

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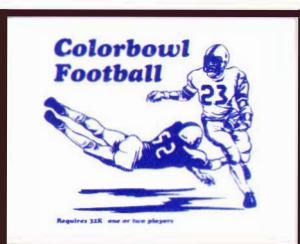
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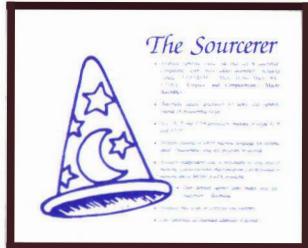
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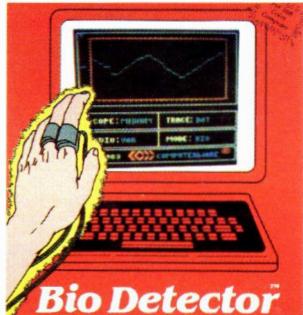
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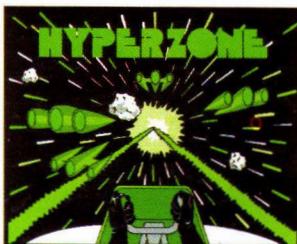
This menu driven symbolic 6809 disassembler produces symbolic source code that can be assembled. Automatic equate generation. FCC, FCB, & FDB generation. Written in position independent code, it is relocatable to any memory area. User defined symbol/label area. Produces files with or without line numbers. Can symbolize all extended addresses if desired. Written in assembly language for extreme speed. Disassemble to disk or cassette, printer, or screen.

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32K D \$64.95



Your landing craft rolls over the surface with its tractors, hops over craters & rocks, & phasers attacking aliens to get to home base. Super graphics & sound!

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Color Basic Compiler

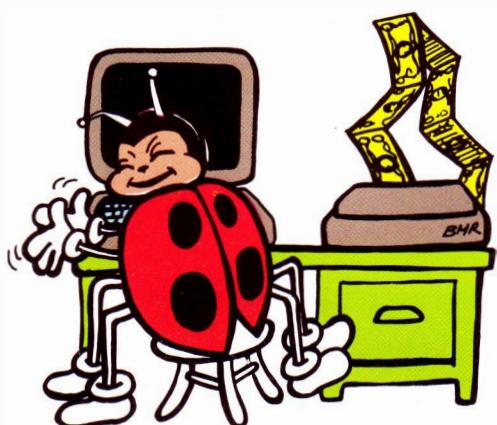
For programmers who want the speed of assembly language & the ease of BASIC. 48 commands & functions, most a subset of Extended BASIC. Generates position independent code so a compiled program can reside anywhere in memory. When the compiler converts your BASIC program into machine language, it will run an average of 40 times faster!

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He jumps across pyramids of brightly colored cubes, dodges springs & bad eggs, using elevator squares, & gaining points as he clears the cubes towards the next screen.

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